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TM 10-3930-642-14&P

TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS INFORMATION AND SUPPLEMENTAL OPERATING, MAINTENANCE AND REPAIR PARTS INSTRUCTIONS)

FOR

TRACTOR, WHEELED, WAREHOUSE, GED 4,000 LB DRAWBAR PULL

Model GC 340-4
NSN 3930-01-075-2812

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HEADQUARTERS, DEPARTMENT OF THE ARMY
MAY 1981

0101.11:

WARNING

FIRE HAZARD

Gasoline and combustible materials
are used in operation and maintenance of this equipment.
DEATH
or severe burns may result if personnel fail to observe
safety precautions

WARNING

POISONOUS GAS HAZARD

Poisonous carbon monoxide gas is
produced during operation of this equipment.
DEATH
or severe injury may result if personnel fail to observe
safety precautions

WARNING

DANGEROUS CHEMICALS

are used in the maintenance of this equipment.
DEATH
or severe injury may result if personnel fail to
observe safety precautions
when mixing acid and water solutions or when
using cleaning solvent (Fed Spec P-D-680)

WARNING

ELECTRICAL SHOCK HAZARD

Always disconnect battery ground cable when working on this
equipment
DEATH
or severe injury may result if personnel fail to
observe this safety precaution

WARNING

FALLING EQUIPMENT HAZARD

Never crawl under equipment when performing maintenance unless
equipment is blocked securely. Do not allow heavy components
to swing while suspended by lifting device. Exercise extreme
caution when working near a cable or chain under tension
DEATH
or severe injury may result if personnel fail to observe this safety precaution

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HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC *11 May 1981*

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS INFORMATION AND SUPPLEMENTAL OPERATING, MAINTENANCE AND REPAIR PARTS INSTRUCTIONS FOR

TRACTOR, WHEELED, WAREHOUSE, GED 4,000 LB DRAWBAR PULL

Model GC 340-4

NSN 3930-01-075-2812

REPORTING OF ERRORS

You can help improve this manual by calling attention to errors and by recommending improvements and by stating your reasons for the recommendations. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), should be mailed directly to Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MBS, Warren, MI 48090. A reply will be furnished direct to you. For your convenience, preaddressed DA Forms 2028-2 are included as final pages of this manual.

PART I. OPERATING INSTRUCTIONS AND SERVICE MANUAL
II. SUPPLEMENTAL MAINTENANCE AND REPAIR PARTS INSTRUCTIONS

AUTHENTICATION STATEMENT

This technical manual is an authentication of the manufacturers' commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

PART I

OPERATING INSTRUCTIONS AND MAINTENANCE MANUAL

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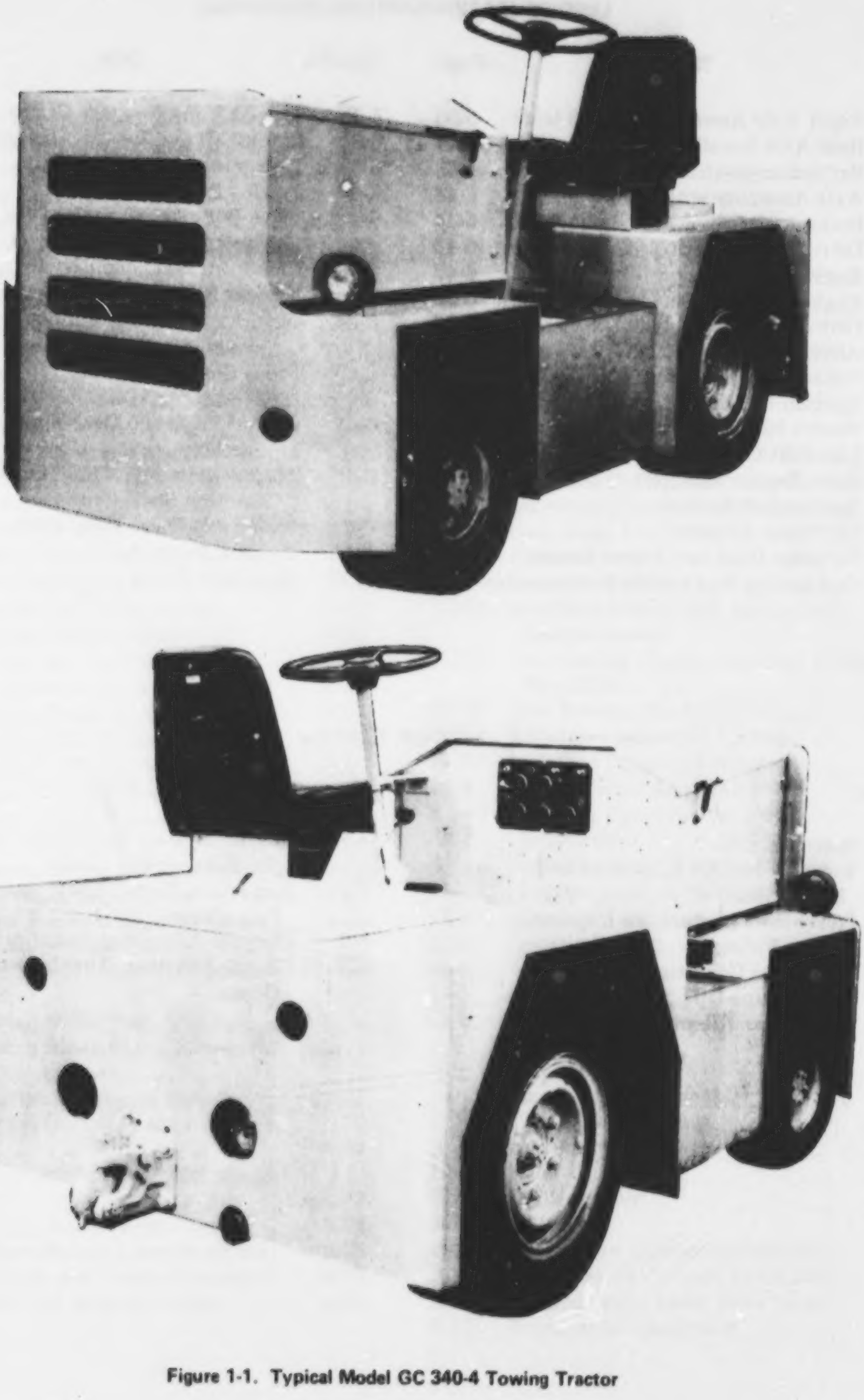


Figure 1-1. Typical Model GC 340-4 Towing Tractor

SECTION I
INTRODUCTION AND DESCRIPTION

1-1. INTRODUCTION.

1-2. GENERAL. This manual provides operation, maintenance and repair instructions for the 4000 lb. Drawbar Pull Wheeled Warehouse Tractor, Model GC 340-4 (see Figure 1-1), manufactured by the United Tractor Co., Chesterton, Indiana 46304. Sections I through V of this manual provide instructions for the operation, maintenance and repair of the tractor and components. Section VI comprises an Illustrated Parts Breakdown of the tractor and components.

1-3. PURPOSE OF EQUIPMENT.

1-4. The wheeled warehouse tractor (hereinafter referred to as the vehicle) is designed for use in warehousing operations, for towing trailers and other wheeled loads. A coupler is provided at the rear of the vehicle for the attachment of the load. General characteristics and performance specifications are given in Table 1-1.

1-5. GENERAL DESCRIPTION.

1-6. The tractor is designed for high maneuverability and ease of operation in warehousing and transfer operations. The vehicle is built in accordance with conventional design for automotive type vehicles, and is equipped with a gasoline engine, three speed automatic transmission, pneumatic tires, and hydraulic brakes. See Figure 1-2 for identification of major components.

1-7. The vehicle is driven by the six cylinder gasoline engine, which provides power to the drive axle through the torque converter and three speed automatic transmission. The drive axle is a double reduction, drop box type, and is equipped with single mounted tires.

1-8. The operator's compartment is outfitted with a cushioned, adjustable seat. All controls and instruments necessary for vehicle operation are conveniently arranged in the operator's compartment, and are generally similar to the controls for any conventional piece of automotive equipment.

Note

> Right hand and left hand are determined from the operator's seat facing toward the front of the vehicle.

1-9. DETAILED DESCRIPTION

1-10. FRAME. The vehicle frame is of unitized welded construction, and incorporates the frame and the body. The frame is fabricated of heavy steel plate, providing sufficient weight and strength to carry all the anticipated stresses of the power train and towed loads. This frame unit provides mounting facilities for the engine, transmission, front and rear axles, and all controls and instruments. A recess is formed in the rear of the frame, over the rear axle, into which a 1350 lb. counterweight is mounted, to increase the traction of the drive axle.

1-11. ENGINE. The engine is a six cylinder in line, overhead valve type. Displacement size is 225 cubic inches. It is equipped with a 12-volt electrical system, which includes a coil and distributor type ignition system, starting system, and a battery charging system of the alternator type. Fuel is supplied to the single throat, manual choke type carburetor by a mechanically operated fuel pump. See Figure 1-3 for engine and transmission assembly.

1-12. TRANSMISSION. The transmission is a three speed, automatic unit with a torque converter. The transmission provides three forward gear ranges (1, 2, and D), neutral, and reverse. Control of the transmission is accomplished through a flexible cable attached to the shift lever at the right of the operator's seat.

1-13. REAR AXLE AND REDUCTION GEARCASE. The rear axle is a single reduction, spiral bevel drive type, and has a reduction gearcase mounted at the input shaft to provide a double reduction final drive ratio. The axle shafts are the semi-floating type. The axle is mounted to the frame with two leaf springs.

1-14. FRONT AXLE. The front axle is a light

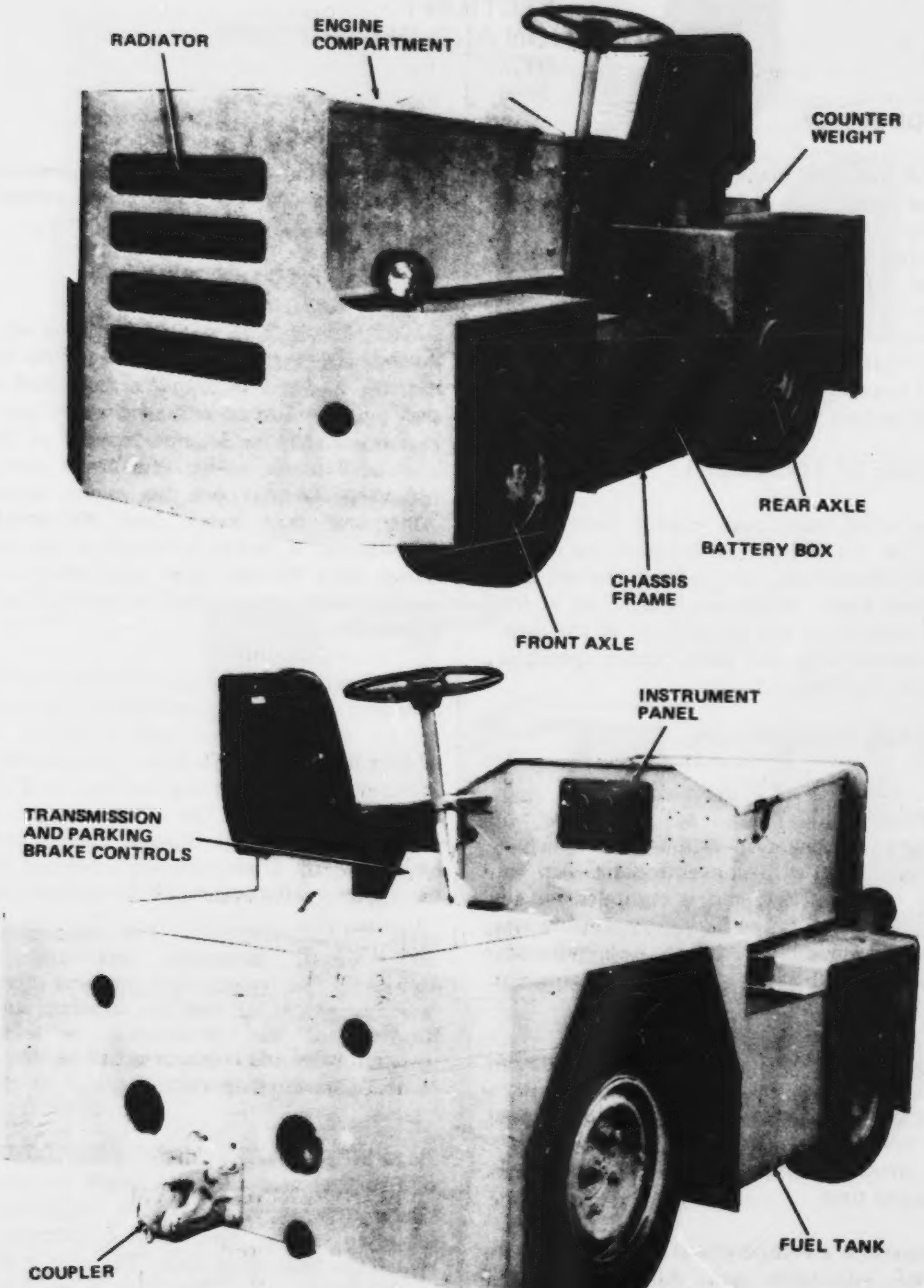

RADIATOR
ENGINE COMPARTMENT
COUNTER WEIGHT
REAR AXLE
BATTERY BOX
CHASSIS FRAME
FRONT AXLE
INSTRUMENT PANEL
TRANSMISSION AND PARKING BRAKE CONTROLS
FUEL TANK
COUPLER

Figure 1-2. Warehouse Tractor Major Components

TABLE 1-1. SPECIFICATIONS

GENERAL	
Vehicle model	GC 340-4
Overall length (excluding coupler)	99 in.
Overall width	59 in.
Overall height	59 in.
Tread (steering axle)	53 in.
Tread (drive axle)	47-1/2 in.
Ground clearance	7-1/2 in.
Drawbar pull	4000 lb.
Vehicle weight	5250 lb.
Top (governed) speed	13 miles/hr.

ENGINE	
Make	Chrysler Industrial
Model	H225-637
Type	Overhead valve, 4 cycle
No. of cylinders	6 in line
Displacement	225 cubic in.
Bore	3.4 in.
Stroke	4.12 in.
Compression	8.4:1
Brake horsepower	119 HP @ 4000 RPM
Torque	204 ft/lbs @ 1200 RPM
Firing order	1-5-3-6-2-4
Engine idle (automatic transmission — drive range)	500 to 525 RPM
Engine idle manifold vacuum at idle speed	17 in.
Oil capacity (incl. 1 qt. required for oil filter replacement)	6 qts.
Oil pressure, hot, at 800 RPM	50 psi

ELECTRICAL	
System type	12 volt—negative ground
Battery	12 volt, lead-acid
Alternator	12 volt, 37 amp.
Starter type	Overrunning clutch
Amperage draw	80 amps max.

TRANSMISSION	
Model	A727
Type	Load Flite
Speeds	3 forward, 1 reverse
Oil capacity	9 quarts, 16 ounces
Gear ratios	Low 2.45 to 1 Intermediate 1.45 to 1 High 1.00 to 1 Reverse 2.20 to 1

FRONT AXLE	
Make	Rockwell Standard
Model	FAE951-FSHX5
Tires	6.90 x 9, 6 ply
Inflation pressure	45 psi

REAR AXLE	
Make	Rockwell Standard
Model	TA267-FHX-33
Drop case reduction ratio	3.0 to 1
Differential reduction ratio	5.666 to 1
Brakes	12.500 dia x 2.25 in.
Tires (dual mounted)	6.50 x 16, 6 ply
Inflation pressure	45 psi

GENERAL CAPACITIES	
Cooling system	14-1/2 quarts
Engine crankcase	6 quarts
Transmission	9-1/2 quarts
Fuel tank	13 gallons
Hydraulic brake system	1 pint
Steering gear	1-1/2 pint
Drop gear case	2 pints
Differential	8 pints

truck type, of tubular construction. Ackerman type steering is used, the steering spindles being mounted on king pins at the ends of the axle with a tie rod connecting the two spindles. The axle is suspended from two semi-elliptical leaf springs, which are, in turn, mounted to the vehicle frame.

1-15. BRAKES. Power brakes are provided for both the front and rear wheels. These are hydraulic brakes of the internal expanding shoe type. Control of the brakes is through a conventional master cylinder and pedal arrangement on the floorplate in the operator's compartment. See Figure 1-4 for a brake system diagram.

1-16. STEERING SYSTEM. The steering system is a completely manual system, utilizing a gemmer-type worm and roller steering gear. The steering gear is mounted below the operator's compartment floorplate and is connected directly to the steering column. Action of the steering gear (in response to turning of the steering wheel) is

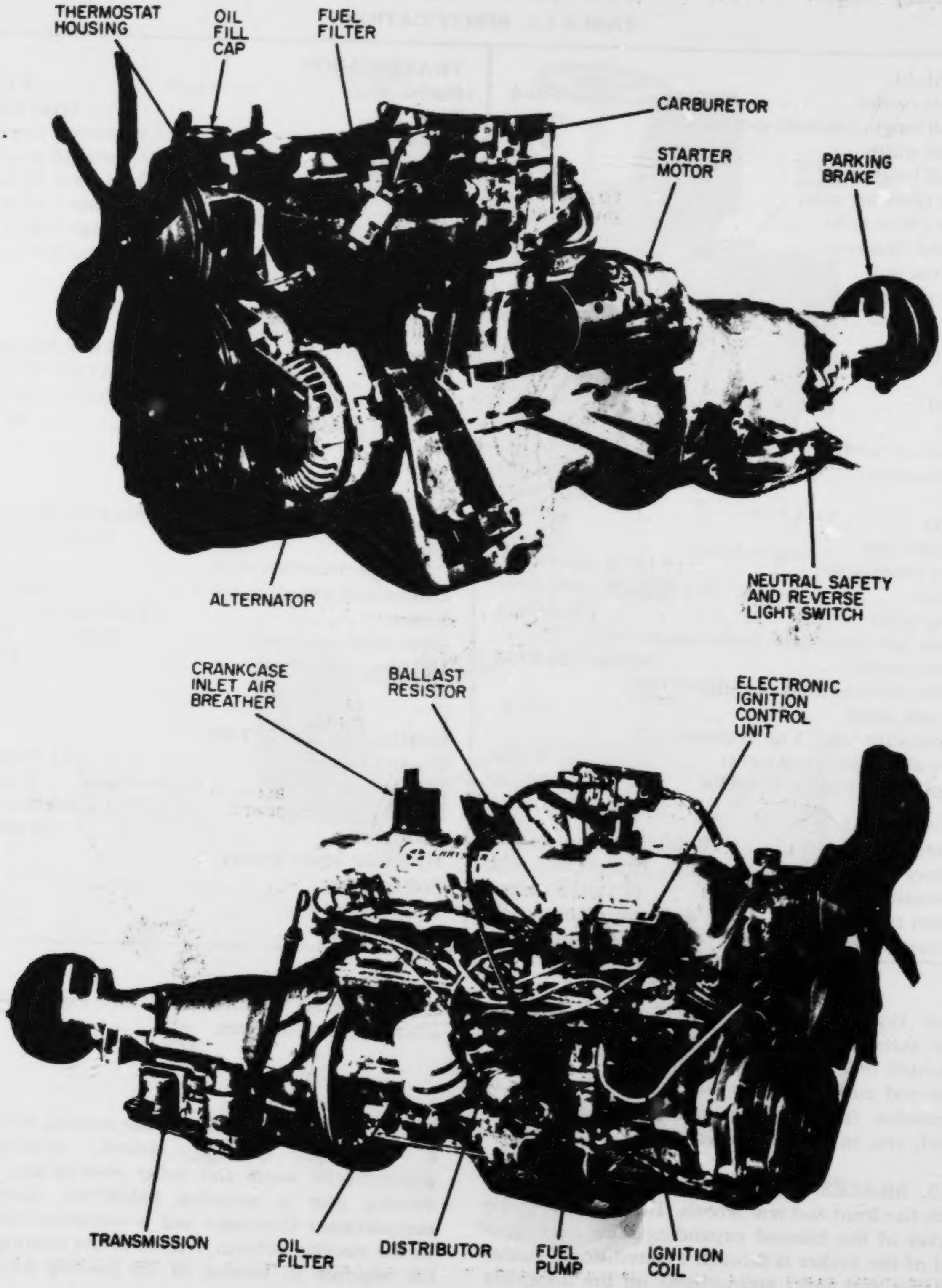
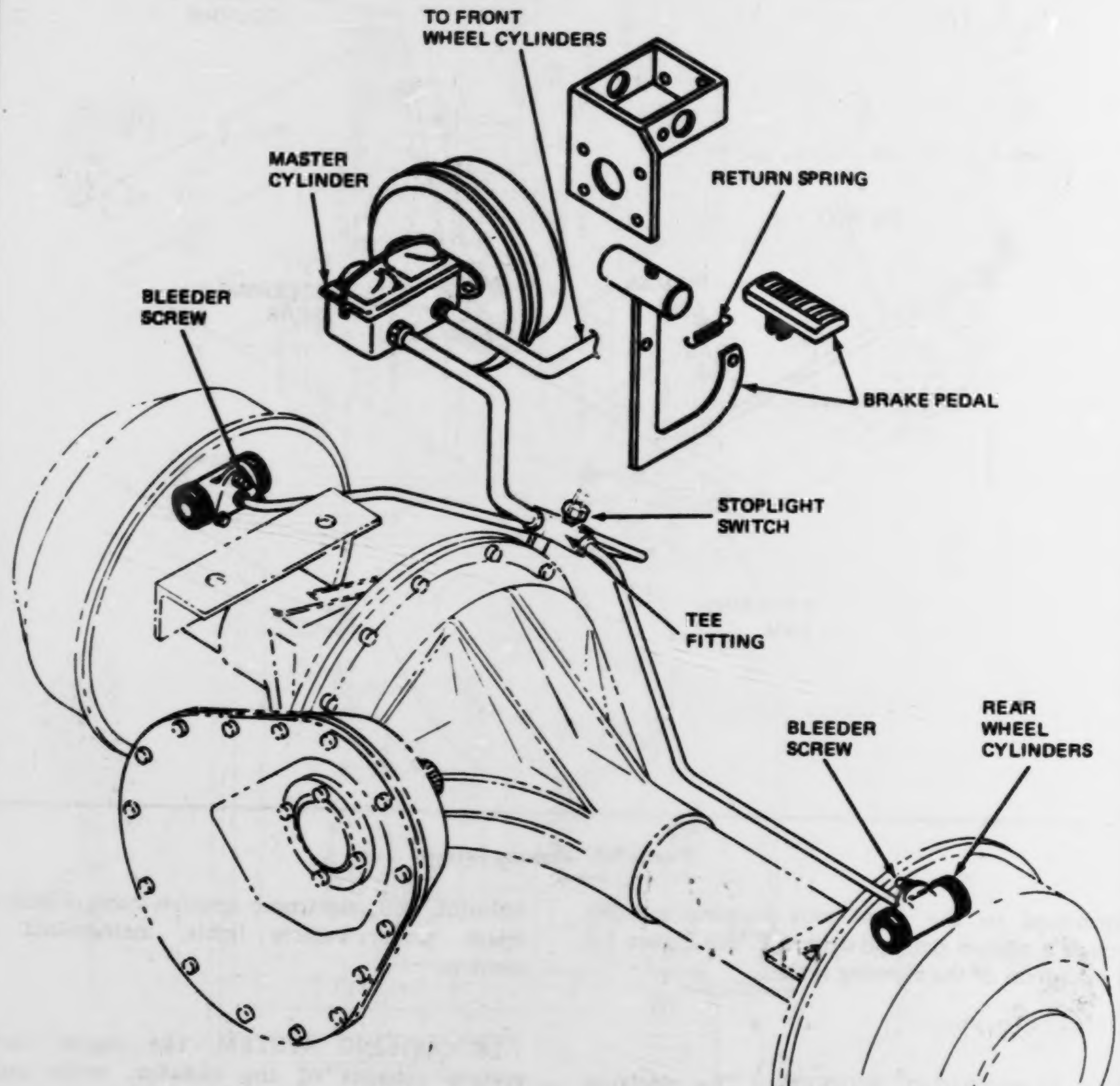

THERMOSTAT HOUSING
OIL FILL CAP
FUEL FILTER
CARBURETOR
STARTER MOTOR
PARKING BRAKE
ALTERNATOR
NEUTRAL SAFETY AND REVERSE LIGHT SWITCH
CRANKCASE INLET AIR BREATHER
BALLAST RESISTOR
ELECTRONIC IGNITION CONTROL UNIT
TRANSMISSION
OIL FILTER
DISTRIBUTOR
FUEL PUMP
IGNITION COIL

Figure 1-3. Engine-Transmission Assembly



TO FRONT WHEEL CYLINDERS
MASTER CYLINDER
RETURN SPRING
BLEEDER SCREW
BRAKE PEDAL
STOPLIGHT SWITCH
TEE FITTING
BLEEDER SCREW
REAR WHEEL CYLINDERS

Figure 1-4. Brake System

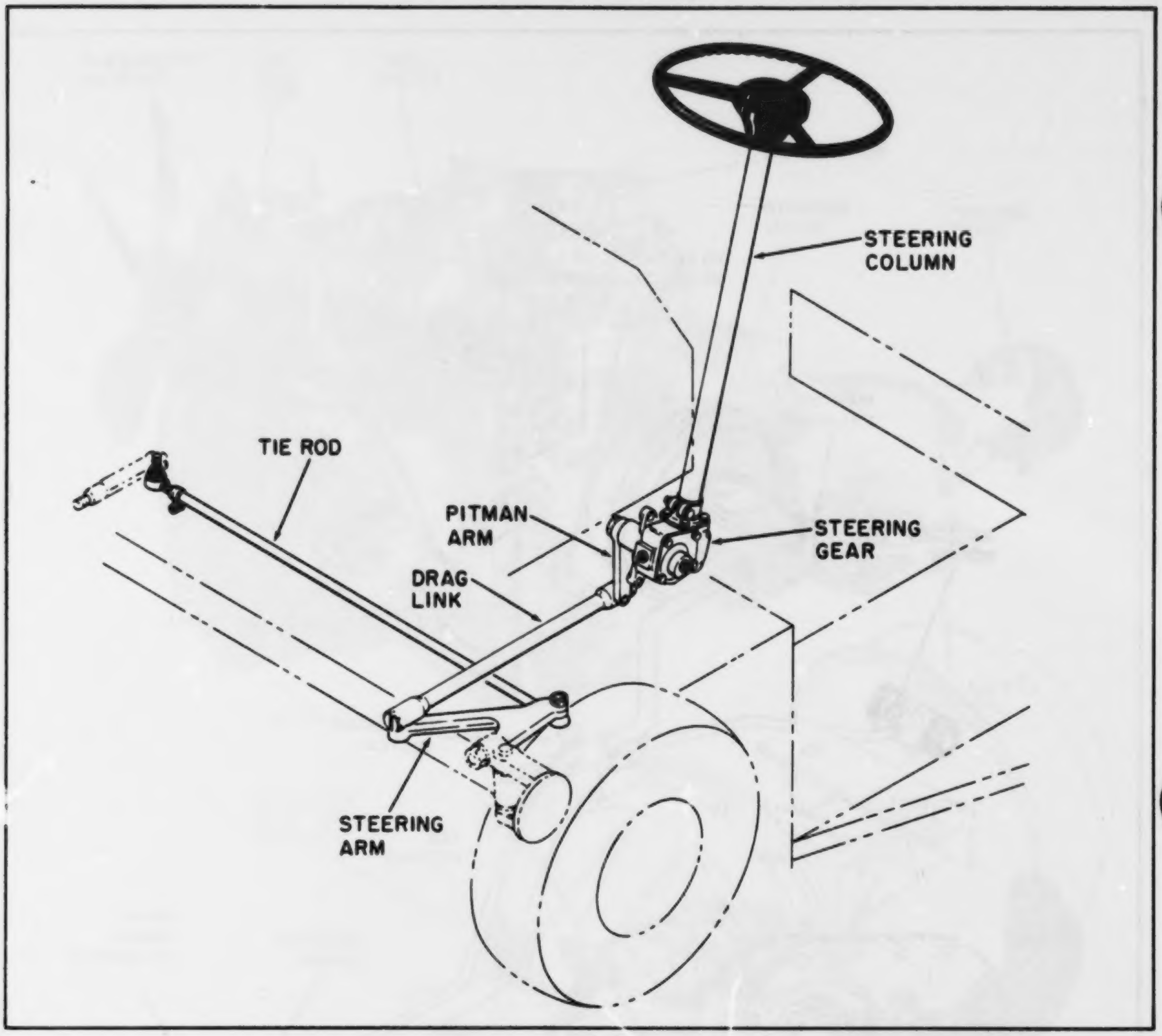


Figure 1-5. Steering System

transmitted to the front axle steering spindles through a pitman arm and drag link. See Figure 1-5 for a diagram of the steering system.

1-17. ELECTRICAL SYSTEM. The electrical system is a 12 volt, negative ground system. System voltage is supplied by a wet-cell storage battery and an alternator which is driven off the engine crankshaft pulley by a V-belt. Output of the alternator is controlled by a solid state voltage regulator. The major components of the system are the battery, alternator, voltage regulator, starting motor and solenoid switch, ignition distributor, coil, electronic ignition control unit and spark plugs, vehicle lights, instruments and senders.

1-18. COOLING SYSTEM. The engine cooling system consists of the radiator, water pump, connecting hoses, engine water jacket, thermostat, cooling fan and fan drive belt. The total cooling system capacity is 14-1/2 quarts. Cooling air i drawn through the tube-and-fin type radiator by action of the fan, which is belt driven from the crankshaft pulley. The thermostat restricts coolant flow through the engine until the engine warms up to 160°F, when the thermostat starts to open. The

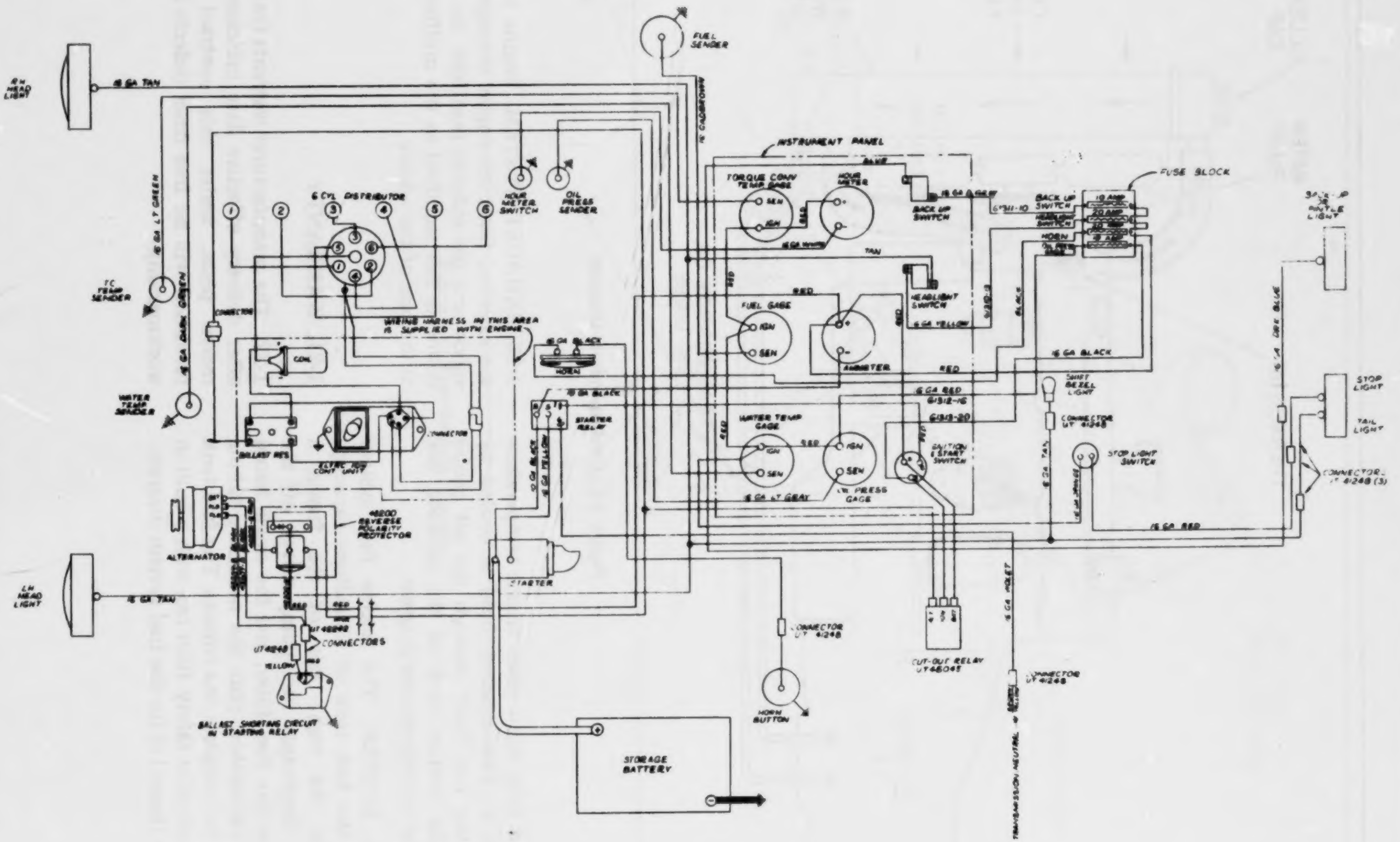

RH HEAD LIGHT
16 GA TAN
FUEL SENDER
16 GA BROWN
INSTRUMENT PANEL
TORQUE CONV TEMP GAGE
SEN
IGN
HOUR METER
BACK UP SWITCH
16 GA GRAY
6-311-10
FUSE BLOCK
BACK UP SWITCH
HEADLIGHT SWITCH
HORN
OIL PRESS GAGE
10 AMP
20 AMP
15 AMP
BACK-UP OR PINTLE LIGHT
16 GA WHITE
TAN
RED
FUEL GAGE
AMMETER
HEADLIGHT SWITCH
16 GA YELLOW
6-312-13
BLACK
16 GA BLACK
16 GA DRK BLUE
16 GA RED
6-1312-16
6-1313-20
SHIFT BEZEL LIGHT
CONNECTOR UT 41248
STOP LIGHT
TAIL LIGHT
WATER TEMP GAGE
OIL PRESS GAGE
16 GA LT GRAY
IGNITION & START SWITCH
16 GA TAN
16 GA ORANGE
STOP LIGHT SWITCH
CONNECTORS UT 41248 (3)
16 GA RED
HOUR METER SWITCH
OIL PRESS SENDER
6 CYL DISTRIBUTOR
1
2
3
4
5
6
16 GA LT GREEN
TC TEMP SENDER
16 GA DARK GREEN
CONNECTOR
WIRING HARNESS IN THIS AREA IS SUPPLIED WITH ENGINE
16 GA BLACK
HORN
16 GA BLACK
STARTER RELAY
10 GA BLACK
16 GA YELLOW
WATER TEMP SENDER
COIL
BALLAST RES.
ELTRC IGN CONT UNIT
CONNECTOR
ALTERNATOR
46200 REVERSE POLARITY PROTECTOR
STARTER
LH HEAD LIGHT
16 GA TAN
RED
UT 46242
CONNECTORS
UT 41248
YELLOW
BALLAST SHORTING CIRCUIT IN STARTING RELAY
STORAGE BATTERY
CONNECTOR UT 41248
HORN BUTTON
CUT-OUT RELAY UT 46045
16 GA VIOLET
CONNECTOR UT 41248
TRANSMISSION NEUTRAL

Figure 1-6. Wiring Diagram

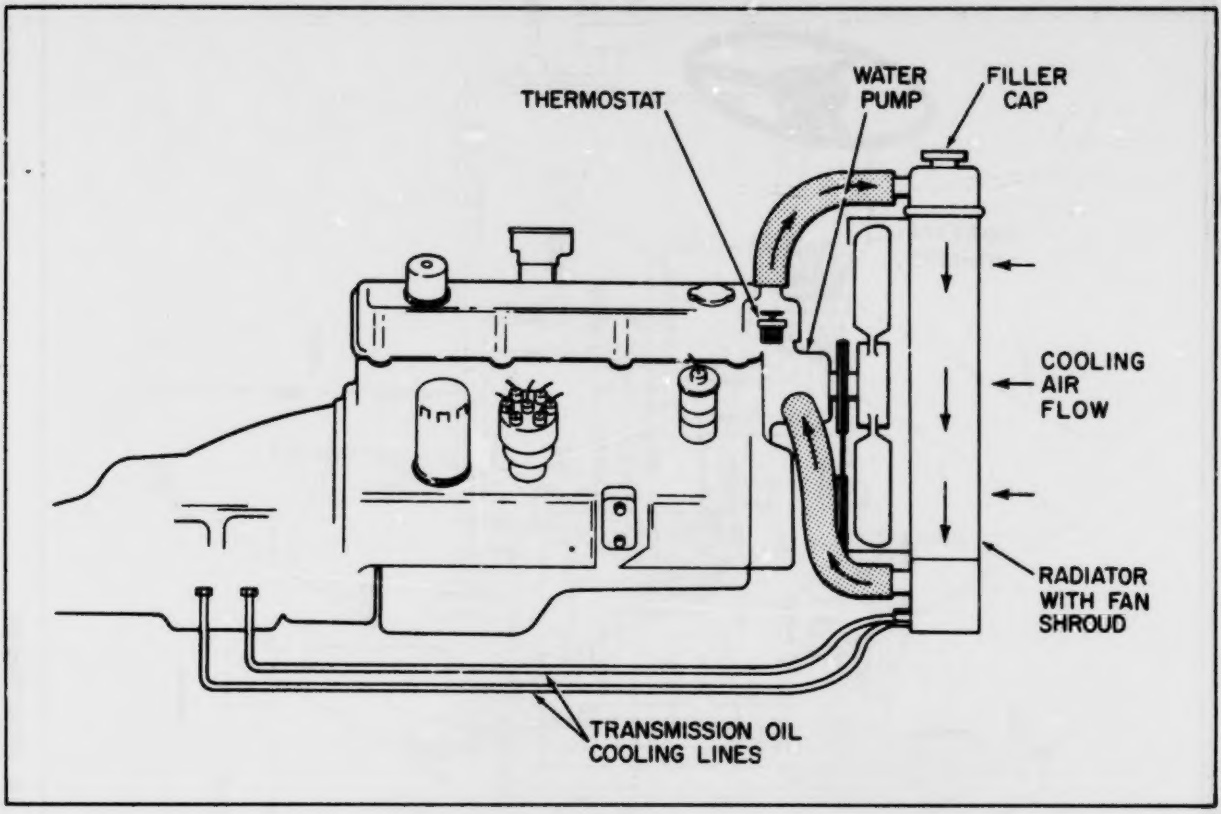


Figure 1-7. Cooling System Diagram

thermostat is fully open when engine temperature reaches 180°F. Transmission fluid is cooled by circulating the hot fluid through the oil cooler built into the bottom tank of the radiator. See Figure 1-7 for cooling system diagram.

1-19. FUEL SYSTEM. The engine fuel system consists of the fuel tank of 13 gallons capacity, mounted to the right side of the frame, a mechanical, diaphragm fuel pump driven off the engine, an in line fuel filter, and the single barrel down-draft carburetor, plus the necessary tubing and fittings to complete the circuits. The fuel tank features a lock-type safety filler cap with a built-in strainer. See figure 1-8 for the fuel system diagram.

1-20 EXHAUST SYSTEM. Engine exhaust gases are expelled from the engine through the exhaust valves and the exhaust manifold. An exhaust pipe connects this manifold to the muffler and tailpipe at the rear of the vehicle.

1-21. WARRANTY

1-22. The manufacturer warrants that for one year after delivery effective date indicated on identification plate, under this contract all supplies furnished will be free from defects in material or workmanship.

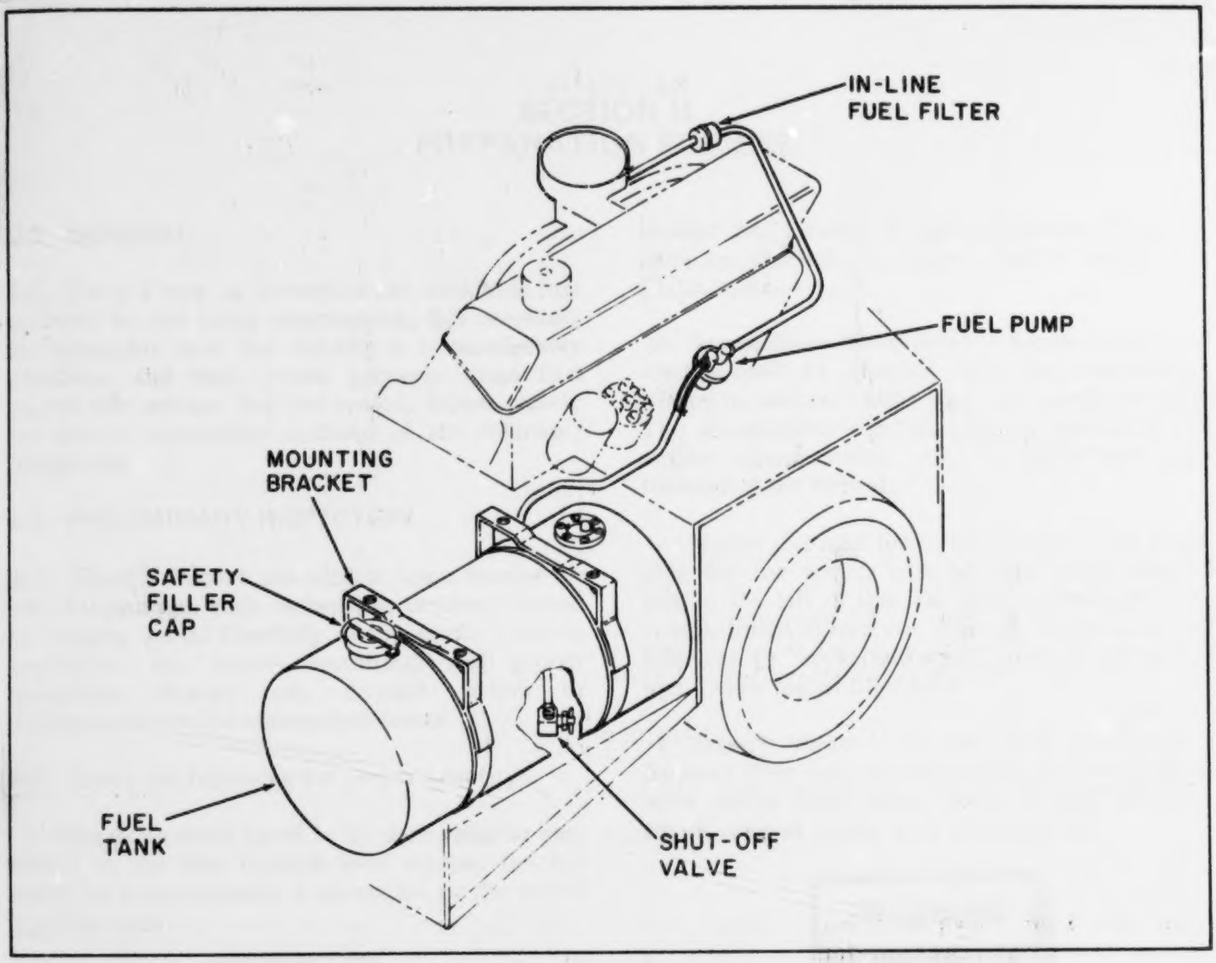

IN-LINE FUEL FILTER
FUEL PUMP
MOUNTING BRACKET
SAFETY FILLER CAP
FUEL TANK
SHUT-OFF VALVE

Figure 1-8. Fuel System Diagram

SECTION II
PREPARATION FOR USE

2-1. GENERAL.

2-2. When a new or reconditioned vehicle is first received by the using organization, it is necessary to determine that the vehicle is in satisfactory condition and will operate properly when first placed into service. For this reason, follow closely the service procedures outlined in the following paragraphs.

2-3. PRELIMINARY INSPECTION.

2-4. Visually inspect the vehicle upon receipt for obvious damage, such as broken, cracked, dented or missing parts. Carefully check pintle hook in particular, for secure mounting, and proper operation. Report any damage, errors or discrepancies on the appropriate forms.

2-5. Check the following for proper quantity:

a. Engine Coolant Level — Remove radiator cap. Check to see that coolant level reaches the full mark, or approximately 2 inches below the top of the filler neck.

CAUTION

If ambient temperature drops below 32°F, also check level of anti-freeze protection by testing coolant with a hydrometer.

b. Fuel Level — Remove fuel filler cap and strainer, or check instrument panel gage reading with ignition switch "ON."

Note

If vehicle has been shipped with a preservative in the fuel tank, a prominent tag will be attached to the machine indicating this fact. Drain the fuel tank of preservative by removing drain plug directly underneath the tank.

c. Engine Oil Level — Open the engine left side panel and remove the dipstick oil gage which is located just forward of the carburetor. Check oil level on dipstick to ensure that it reaches the FULL mark.

d. Transmission Fluid Level — Transmission fluid level should be checked with the transmission warm, in neutral range, and the engine running. The transmission dipstick gage is located in the engine compartment, on the right side, just forward of the firewall.

e. Master Cylinder Brake Fluid Level — An access plug for the master cylinder filler cap is located just to the left of the seat base, on the operator's compartment floorplate. Remove access plug and filler cap to check fluid level, which should be 1/4 inch below top of filler neck.

f. Battery Water Level and State of Charge — Remove filler caps on the battery and check water level, which must cover plates at least 3/8 inch. Check state of charge with a hydrometer.

WARNING

Do not smoke, weld, or employ any open flame near the battery, as an explosive gas is produced by the battery during its operation.

2-6. SWITCHES, GAGES, AND LIGHTS. Check operation of neutral start switch by placing direction selector in forward or reverse position, turning ignition switch ON, and pushing starter button. Starter must not engage until direction selector is returned to NEUTRAL position.

2-7. Start engine and check hourmeter, temperature gages, oil pressure gage, ammeter, and fuel level gage for proper operation.

2-8. Turn light switch ON and check to see that headlight and taillight are both operable. Check operation of horn by depressing center button in steering wheel.

2-9. OPERATIONAL CHECK. Refer to operating instructions in Section III and check operation of engine, transmission, and brakes. Check that parking brake will prevent truck motion with transmission in gear and engine at full stall speed.

2-10. LUBRICATION. Check machine record or service tags for indication of last periodic maintenance performance. If necessary, service the vehicle in accordance with the lubrication chart, Figure 4-1, using proper weight of lubricant for the prevailing climatic conditions.

SECTION III
OPERATION

3-1. GENERAL.

3-2. This section provides information and instructions concerning the proper operation and use of the vehicle. Operating and maintenance personnel should become thoroughly familiar with the vehicle, and these instructions, before attempting any operation or service procedure.

3-3. PRINCIPLES OF OPERATION.

3-4. GENERAL. This vehicle provides a compact, mobile means of towing trailers, carts, and other wheeled loads in warehousing and transfer operations. The vehicle engine provides the power for movement of the tractor and towing operations involving a drawbar pull of up to 4000 lbs.

3-5. Torque generated by the engine is multiplied by the torque converter as required in the lower speed ranges with the engine under load; under no-load conditions the engine acts as an efficient fluid coupling. The transmission combines planetary gear sets and hydraulic clutches to provide three forward gear ratios, neutral, and one reverse ratio.

3-6. The engine and transmission are bolted together and mounted as a unit in the forward compartment of the tractor. A slip-joint propeller shaft connects the output yoke of the transmission to the input yoke of the rear axle reduction gear case. The axle is mounted to the vehicle frame with two leaf springs.

3-7. Final drive of the vehicle is accomplished through the rear axle assembly, consisting of the reduction gear and the rear axle proper. The reduction gear is a set of spur gears operating inside gear case attached to the drive axle. These spur gears provide an initial 3:1 reduction ratio to the xle input speed. Final gear reduction is made hrough the spiral pinion and ring gear inside the rive axle. A differential unit is provided in the xle design to permit turning corners without cuffing tires. The axle shafts are semi-floating. ydraulic brakes are provided at the drive wheels. he backing plate and brake assembly is mounted a flange on the axle housing, while the brake rum and wheel studs are mounted on the axle aft flange.

3-8. CONTROLS AND INSTRUMENTS.

3-9. The following paragraphs explain the function and proper use of all controls and instruments furnished on the truck.

3-10. Refer to figure 3-1 for an illustration of all controls and instruments. The table accompanying the illustration explains the function of each control and gives the normal reading for each gage.

3-11. OPERATING INSTRUCTIONS.

3-12. Personnel required to operate this vehicle should become thoroughly familiar with all controls and instruments and should also become acquainted with the specific handling and operating characteristics of this vehicle prior to actual performance of loading/unloading operations.

3-13. STARTING THE ENGINE.

a. Perform the daily preventive maintenance services, indicated in table 4-2.

b. Pull up on parking brake lever to make certain truck will remain stationary while it is being started.

c. Make certain the direction shift lever is in neutral (N) position.

d. At initial starting, or if engine is cold, pull choke control all the way out.

e. Press down on accelerator pedal approximately one-third the distance from its normal position.

CAUTION

Do not operate the starter motor continuously for more than 30 seconds. If the engine fails to start after 30 seconds, allow the starter motor to cool for at least two (2) minutes before attempting to start the engine again.

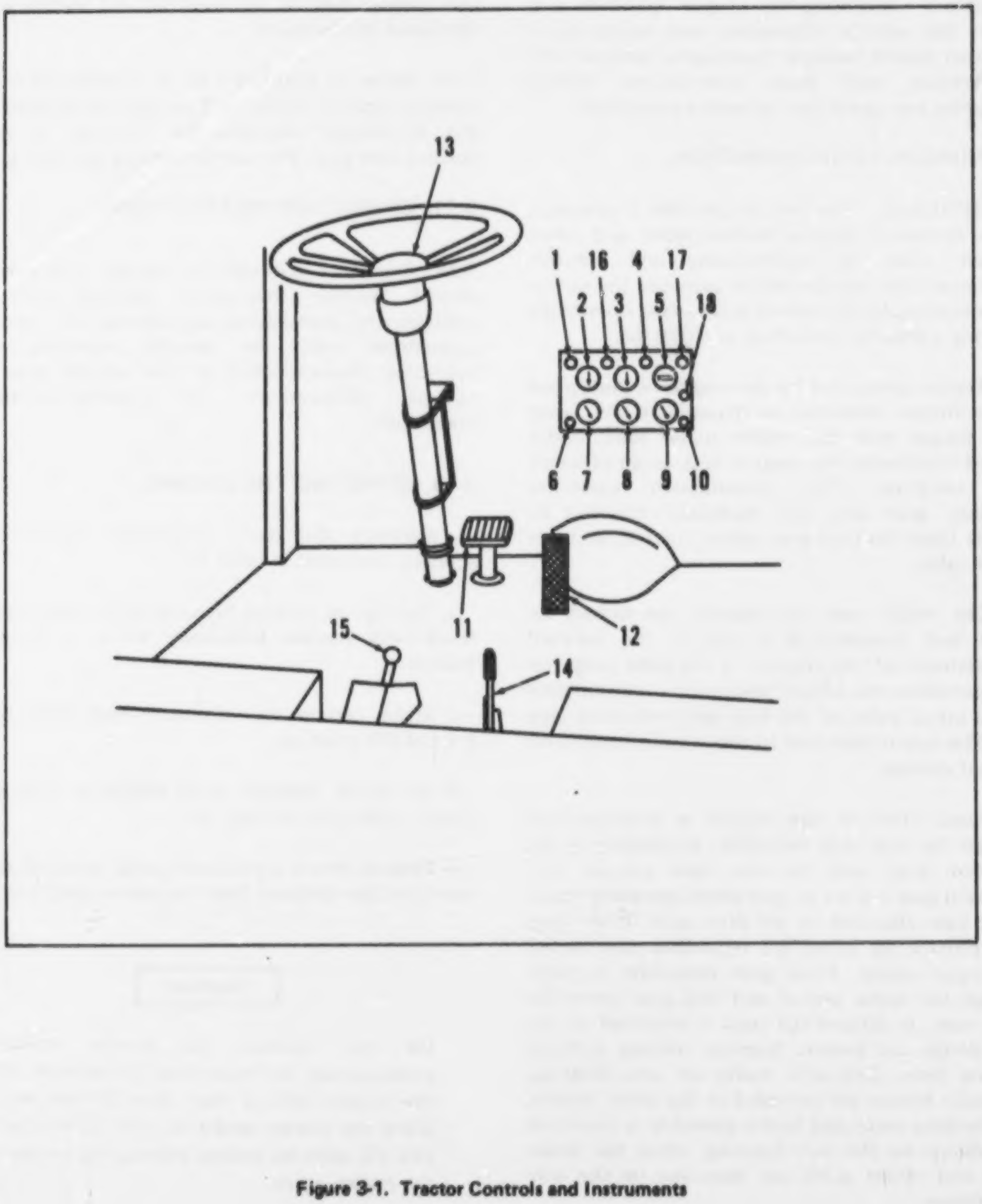

13
1
16
4
17
2
3
5
18
6
7
8
9
10
11
12
15
14

Figure 3-1. Tractor Controls and Instruments

LEGEND FOR FIGURE 3-1

INDEX NO.	NOMENCLATURE	NORMAL USE OR READING
1.	Ignition/Start Switch	When turned clockwise to first detent, energizes engine ignition, instruments and accessory circuits. Turning further to second detent engages starter. Release when engine starts. Turning counterclockwise to OFF shuts off engine.
2.	Oil Pressure Gage	Indicates engine lubricating oil pressure in PSI. Normally 15-80 PSI (50 PSI at 800 RPM).
3.	Ammeter	Indicates rate of battery charge or discharge. With engine running, should read slightly to the + side of "0".
4.	Light Switch	Pull to ON to illuminate headlight and taillight. Push in to OFF to extinguish lights.
5.	Hourmeter	Indicates total engine operating time in hours and tenths.
6.	Choke Control	Pull out to choke engine for cold starting.
7.	Water Temperature Gage	Indicates temperatures of engine coolant water in degrees (°F). Normally 175°F-200°F.
8.	Fuel Level Gage	Indicates quantity of fuel remaining in fuel tank. E=empty, F=full (tank capacity is 13 gallons).
9.	Torque Converter Temperature Gage	Indicates Transmission Oil Temperature in degrees (°F). Normally 200°F-230°F. DO NOT ALLOW TO EXCEED 270°F.
10.	Torque Converter Temperature Warning Light	Indicates transmission oil overheating (270°F).
11.	Service Brake Pedal	Depress to apply service brakes.
12.	Accelerator	Depress to increase engine speed.
13.	Horn Button	Depress to sound horn.
14.	Parking Brake Lever	Pull back to apply parking brake; push forward to release parking brake.
15.	Brake Lever Knob	Turn clockwise to tighten linkage and remove slack.
16.	Wiper Switch	Pull ON to activate windshield wiper. Push OFF to deactivate wiper.
17.	Rear Light Switch	Pull ON to illuminate rear work light. Push OFF to extinguish light.
18.	Heater Switch	Pull out to first detent to operate heater fan at high speed, out to second detent for low speed. Push in to stop fan.

f. Turn the ignition switch to the ON position, & turn further to START position while the starter motor cranks the engine. As soon as the engine starts, release the key.

Note

> If engine becomes over-choked or carburetor floods, push choke button in, depress accelerator pedal fully, and engage starter. If all equipment is in working order, the engine should start.

g. Hold accelerator pedal steady and allow engine to warm up at a fast idling speed. Immediately observe engine oil pressure gage and ammeter for normal readings. As engine begins to warm up, gradually push in on choke control; as soon as engine is warm, push choke control all the way in.

h. Warm engine until it will idle smoothly with the choke control pushed all the way in. Check for proper reading on ammeter, engine oil pressure gage, engine temperature indicator, and fuel indicator. Be sure hour meter is operating properly.

i. Remove foot pressure from accelerator pedal. Report any malfunctions to the proper authority.

3-14. MOBILE OPERATION.

3-15. GENERAL. Operation of this vehicle is essentially the same as that for any automotive-type equipment; all controls and instruments are positioned conveniently for operators use, and in approximately the same location or relationship as that used in an ordinary truck or passenger car. Operators should familiarize themselves with the steering and performance characteristics of the vehicle before attempting to perform any actual towing operations. Sudden starts, stops, and turns are to be avoided except in cases of emergency.

3-16. TOWING OPERATIONS. During towing operations, keep vehicle in a gear range that will provide adequate torque for negotiation of grades. Vehicle speed must be kept low enough that the vehicle and load can be safely stopped, within an assured clear distance.

a. Always check the coupler connection to see that the hook is properly engaged with the drawbar lunette eye or coupling.

b. When negotiating turns or operating in areas where clearances are restricted, always take into consideration the physical size and steering characteristics of the load being towed.

c. When towing loads at or near maximum capacity, and operating in low range continuously closely monitor transmission oil temperature gage. DO NOT ALLOW OIL TEMPERATURE TO EXCEED 270 °F. If temperature reaches 270°F, stop vehicle, shift to neutral range and run engine at a fast idle until oil temperature drops back to a normal level.

3-17. STOPPING THE TRACTOR.

a. Remove foot from accelerator pedal.

b. Apply gradual foot pressure to the brake pedal to bring the vehicle to a smooth, safe stop. Avoid sudden application of full braking effort except in cases of emergency.

c. Shift to neutral range and apply parking brake,

d. Turn ignition switch to OFF to shut down engine.

CAUTION

> If the engine has been operating at, or near, full load, it should be allowed to run at fast idle (600 to 800 RPM) for several minutes after the load is removed before being stopped. This allows internal engine temperatures to equalize.

3-18. SAFETY PRECAUTIONS. The use of powered equipment is subject to certain hazards that cannot be overcome by purely mechanical means. The exercise of intelligence, care and common sense by the operator is essential to minimize the hazards of overloading, slipping, obstructions in the path of travel, or the use of equipment in operations for which it is not intended or designed. Following are a few suggestions that should be followed in the operation of this vehicle:

a. The operator should be qualified and drive accordance with safety rules.

b. If the vehicle does not operate properly, report to proper authority. A minor adjustment now may save a major repair later.

c. Avoid sudden stops or starts. When backing up, check for obstructions or personnel in the path of the vehicle before moving.

d. Drive carefully at all times. Exercise caution at cross aisles, sounding horn for safety.

e. Do not allow more than one passenger.

f. Operate the vehicle at a safe distance behind other vehicles.

g. Do not operate vehicle with wet or greasy hands.

h. Observe highway traffic laws in the operation of the vehicle.

i. Drive carefully on wet or slippery surfaces.

j. Keep feet within perimeter of floor board.

k. Observe the Operating Instructions and Preventive Maintenance Instructions given in this manual.

l. Avoid overloading the vehicle — this is a hazardous practice, for the operator as well as the equipment. Overloading shortens the life of the vehicle and increases maintenance costs.

WARNING

Do not operate vehicle for prolonged periods in an unventilated area. All gasoline engines produce poisonous carbon monoxide gas which is extremely toxic if allowed to accumulate in a closed area.

m. Be sure the brakes are in proper working condition. Be sure all mechanical and electrical components are in good working order prior to each shift of operation.

3-19. OPERATION UNDER UNUSUAL CONDITIONS.

3-20. EXTREME HEAT.

3-21. COOLING SYSTEM.

a. Make sure fan belts are properly adjusted.

b. Check coolant level frequently, and be sure radiator cap is secure.

c. Keep exterior of radiator clean and free of foreign matter which might affect circulation of air.

d. Flush and clean cooling system frequently.

3-22. BATTERY. Check electrolyte level frequently and maintain at proper levels.

3-23. LUBRICATION. Observe instructions on Lubrication Chart, figure 4-1.

3-24. FUEL SYSTEM. Fill fuel tank at end of day to expel moisture which may collect in vapor form inside the tank.

3-25. EXTREME COLD.

3-26. SHELTER. The truck should be sheltered in a closed building with some heat, if possible. If this is not possible, cover with a tarpaulin or similar kind of material.

3-27. COOLING SYSTEM. Add proper amount of ethylene glycol anti-freeze to cooling system. A solution of 7-1/2 quarts ethylene glycol and 7 quarts of water will afford protection to -35°F. If anti-freeze is not available, drain radiator and cylinder block when ambient temperature is expected to drop below 32°F. Never add water to the cooling system without subsequently checking the anti-freeze solution for adequate strength and adding anti-freeze if necessary.

3-28. ELECTRICAL SYSTEM.

a. Test the specific gravity of the electrolyte in the battery, using a hydrometer. Specific gravity reading should be between 1.260 and 1.275 at 80°F.

b. Electrolyte level of battery must be maintained at 1/2 inch above plates. Do not add water to a battery which has been exposed to cold temperature except when engine is to be operated immediately.

c. Remove battery and store it in a warm place when shelter for truck is not available. The efficiency of the battery decreases at lower temperatures, and a completely discharged battery will freeze at 20°F.

d. Be sure that wires and cables are in good condition and that all connections are clean, dry and secure.

e. Clean spark plugs and check gaps.

f. Be sure terminal sockets and spark plug terminals are clean.

3-29. LUBRICATION. Follow lubrication instructions contained in Lubrication Chart, figure 4-1.

3-30. FUEL SYSTEM.

a. Use prescribed winter grade of fuel.

b. Fill fuel tank at the end of the day to expel moisture.

3-31. HUMID CLIMATES.

3-32. In tropical areas, if paint is chipped, or scratched, the affected area should be refinished immediately to prevent rapid formation of rust. Remove all loose paint with paint remover, sandpaper, or sandblasting equipment. Apply two coats of red lead primer and, when dry, apply finishing coat of paint.

3-33. DUSTY CONDITIONS.

3-34. Operators of trucks used in extremely dusty conditions should check the air cleaner daily to insure that excessive build-up of dust or dirt, which would restrict air flow, is not permitted. Lubrication service intervals for all items should be reduced to one-half the normal period, or as short as 50 hours, depending upon the severity of the service.

SECTION IV

PERIODIC INSPECTION, MAINTENANCE AND LUBRICATION

4-1. INTRODUCTION.

4-2. GENERAL. This section presents general preventive maintenance procedures to be followed on a regularly scheduled basis. Manufacturer's recommended lubrication and inspection schedules, as well as troubleshooting information, are included.

4-3. SPECIAL TOOLS.

4-4. Special tools required for the performance of inspection, maintenance and testing of the vehicle and its components are listed in Table 4-1.

4-5. PERIODIC INSPECTION.

4-6. A periodic inspection schedule must be established and maintained in accordance with the information given in Table 4-2. Intervals specified are maximum periods permissible and are based on optimum service conditions. Adjust inspection intervals accordingly if extreme climatic or operating conditions exist for any extended period of vehicle operation.

4-7. PERIODIC SERVICE AND LUBRICATION.

4-8. Refer to figure 4-1 for the lubrication chart, which indicates proper lubricants to be used in servicing the vehicle, the points of application, and the maximum intervals for performance of lubrication services. Adjust lubrication intervals to some shorter periods if extreme climatic conditions or severity of service require more frequent attention to lubrication. Periodic lubrication services may be omitted while the vehicle is in dead storage.

4-9. AIR CLEANER. Air cleaner service intervals are determined primarily by the severity of service in which the vehicle is used. Operation in extremely hot, humid, or dusty conditions will require that the service intervals be shortened proportionately. Generally, the air cleaner should be inspected and clenaed monthly or at each 100 hour interval, and changed every six months.

4-10. Service the air cleaner as follows: See figure 4-2.

a. Remove the nut and washer from the air cleaner center stud, disconnect hose from crankcase breather, and lift off the top cap.

b. Lift off filter element from lower half assembly. Raise lower half assembly evenly from carburetor air horn.

c. Clean filter element with compressed air nozzle held 2 inches from inside of filter and blow out. See figure 4-3.

Note

Do not wash or oil filter element.

d. Clean top cap and lower half assembly with solvent, Specification P-D-680, or kerosene, and air dry.

e. Replace lower half assembly to carburetor.

f. Place filter element onto lower half assembly.

g. Place top cap over filter element. Secure in place with washer and nut.

h. Reconnect crankcase breather hose to aircleaner lower half assembly.

TABLE 4-1. SPECIAL TOOLS FOR INSPECTION AND MAINTENANCE

Nomenclature	Part/Model No.	Manufacturer	Range	Application
Cooling System Tester		Stant Manufacturing	4-17 psi	See para. 4-27
Pressure Bleeder	Fluid-Bal	Wagner-Electric	0-30 psi	See para. 4-34
Expanded Scale Voltmeter	260	Simpson	0-50 volts	See paras. 4-45, & 4-46
Compression Gage			0-300 psi	See para. 4-68
Distributor Tester		Sun		See para. 4-54
Vacuum Gage			0-30 in.hg.	See para. 4-60

TABLE 4-2. PREVENTIVE MAINTENANCE INSPECTION (Sheet 1)

	INSPECTION INTERVAL		
	Daily, when used	3 months or 300 operating hours, whichever comes first	Annual, or 1200 operating hours, whichever comes first
AXLES			
Check and tighten wheel mounting nuts.		X	
Check security of axle mounting to frame.			X
Check differentials for oil leaks.		X	
Check differential and reduction gear case lubricant level.		X	
WHEELS AND TIRES			
Check tires for cuts or foreign objects.	X		
Check hub bolt nuts.		X	
Check bearings for looseness.			X
Check oil seals.		X	
Remove wheelbearings and check bearings and race for defects.			X

TABLE 4-2. PREVENTIVE MAINTENANCE INSPECTION (Sheet 2)

	INSPECTION INTERVAL		
	Daily, when used	3 months or 300 operating hours, whichever comes first	Annual, or 1200 operating hours, whichever comes first
BRAKES — SERVICE			
Check master cylinder fluid level.	X		
Check brake lines for leaks.	X		
Check brakes for proper operation.	X		
Inspect linings for wear.			X
Check stoplight switch operation.	X		
BRAKES — PARKING			
Check linkage and cable for wear, and adjust.		X	
Check linings for wear.			X
Check for proper operation.	X		
COOLING SYSTEM			
Check coolant level in radiator.	X		
Check anti-freeze protection.		X	
Check coolant color and cleanliness.		X	
Check all hoses and connections for leaks.	X		
Check water pump inlet and outlet connection for leaks.		X	
Flush coolant system.		X	
Check radiator for leaks, and mounting for security.		X	
Check thermostat operation, and housing for tightness.		X	
ENGINE			
Check cylinder head nuts.			X
Check manifold nuts and gasket.			X
Check tappet clearance and oil supply to valve springs and seats			X
Check air cleaner for condition of the element.	X		
Check and adjust water pump and alternator belt tension.		X	

TABLE 4-2. PREVENTIVE MAINTENANCE INSPECTION (Sheet 3)

	INSPECTION INTERVAL		
	Daily, when used	3 months or 300 operating hours, whichever comes first	Annual, or 1200 operating hours, whichever comes first
ENGINE FUEL SYSTEM			
Replace fuel filter.			X
Drain fuel tank, to remove water and sediment.		X	
Check all fuel lines for leaks.		X	
Check fuel supply gage, for accuracy.		X	
Check fuel pump gaskets for leaks.		X	
Visually check fuel tank for leaks.		X	
Check accelerator linkage clevis pins and cotter pins for wear or damage.		X	
ENGINE ALTERNATOR			
Check ammeter to ensure that the alternator is functioning correctly.	X		
Check for worn brushes.			X
Check voltage regulator output.		X	
ELECTRICAL			
Check all connections.			X
Check for chafed or broken wires.			X
Check retaining clips and grommets.			X
Check operation of lights.	X		
Clean exterior of lamps.	X		
With engine running, check for normal operation and indications of instruments.	X		
BATTERY			
Check specific gravity.		X	
Check electrolyte level.	X		
Check terminals and cables for corrosion and tightness.		X	
TRANSMISSION			
Check fluid level	X		
Check for oil leaks.		X	
Drain and refill.			X

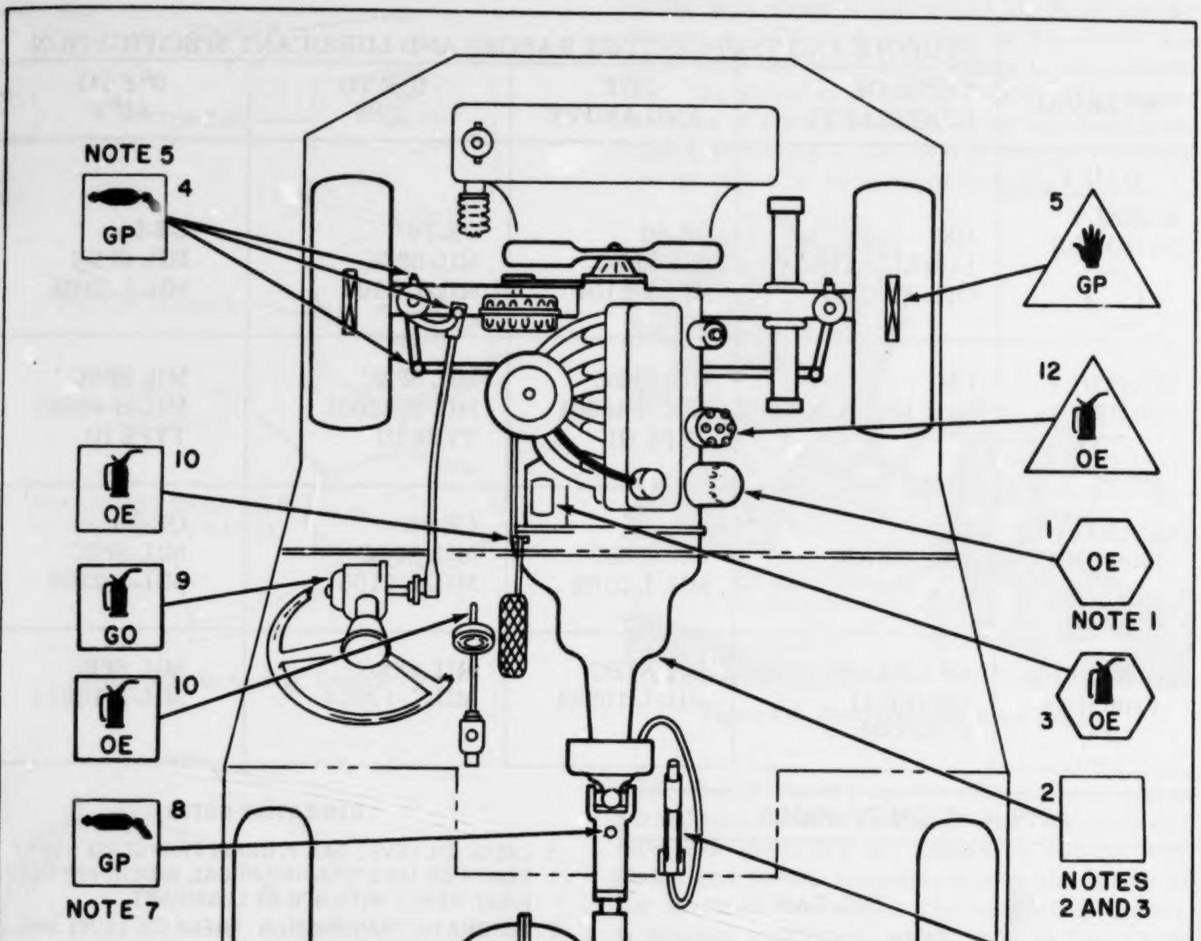

NOTE 5
4
GP
5
GP
12
OE
10
OE
1
OE
NOTE 1
9
GO
10
OE
3
OE
2
NOTES 2 AND 3
8
GP
NOTE 7
SEE NOTE 4
11
5
GP
13
OE
7
GO
NOTE 6
6
GO
NOTE 6

Figure 4-1. Lubrication Chart (Sheet 1)

LUBRICANT KEY

INTERVAL	SYMBOLS AND TEMPERATURE RANGES AND LUBRICANT SPECIFICATION			
	TYPES OF LUBRICANTS	32°F AND ABOVE	0°F TO 32°F	0°F TO -65°F
DAILY WEEKLY 50 HOURS ○	OE LUBRICATING OIL, ENGINE	OE-30 MIL SPEC MIL-L-2104	OE-10 MIL SPEC MIL-L-2104	OE-5 MIL SPEC MIL-L-2104
MONTHLY 100 HRS ⬡	OH OIL, HYDRAULIC	MIL SPEC MIL-H-46001 TYPE III	MIL SPEC MIL-H-46001 TYPE III	MIL SPEC MIL-H-46001 TYPE III
QUARTERLY 300 HRS □	GO OIL, GEAR	OE-90 MIL SPEC MIL-L-2105	OE-90 MIL SPEC MIL-L-2105	OE-90 MIL SPEC MIL-L-2105
ANNUALLY 1200 HRS △	GP GREASE, GENERAL PURPOSE	MIL SPEC MIL-L-10924	MIL SPEC MIL-L-10924	MIL SPEC MIL-L-10924

APPLICATION SYMBOLS

OIL CAN
✋ HAND
GREASE GUN
🖌 BRUSH

LEGEND FOR FIGURE 4-1

1. Engine and crankcase (see note 1)
2. Transmission (see note 2 & 3)
3. Starter
4. Steering knuckle, tie rod ends, and drag link (see note 5)
5. Wheel bearings
6. Reduction Gearcase (see note 6)
7. Differential (See note 6)
8. Propeller shaft
9. Steering gear
10. Throttle, brake, and transmission linkage
11. Parking brake cable and linkage
12. Crankcase inlet air breather
13. Coupler

LUBRICATION NOTES

1. CHECK OIL LEVEL DAILY. DRAIN CRANKCASE EVERY MONTH OR 100 OPERATING HOURS, WHICHEVER OCCURS FIRST. REFILL WITH NEW OE LUBRICANT.
2. AUTOMATIC TRANSMISSION - CHECK OIL LEVEL DAILY.
3. DRAIN THE TRANSMISSION QUARTERLY OR EVERY 300 HOURS. CLEAN THE OIL PAN AND CONTROL VALVE SCREEN. REFILL WITH NEW TYPE AQ-ATF, SUFFIX A AUTOMATIC TRANSMISSION FLUID.
4. CONTROL CABLES - LUBRICATE ANNUALLY WITH GREASE, AIRCRAFT AND INSTRUMENTS, MIL-G-23827.
5. INTERVALS SPECIFIED ARE FOR NORMAL OPERATION. THE MAINTENANCE OFFICER MAY ADJUST THE INTERVALS TO COMPENSATE FOR UNUSUAL CLIMATIC OR OPERATIONAL CONDITIONS.
6. CHECK LUBRICANT LEVEL QUARTERLY OR EVERY 300 OPERATING HOURS. ANNUALLY OR EVERY 1200 HOURS, DRAIN, FLUSH AND REFILL WITH NEW LUBRICANT WHILE THE DIFFERENTIAL IS HOT FROM RECENT OPERATION.
7. CLEAN THE LUBRICATION FITTINGS WITH DRY CLEANING SOLVENT, FEDERAL SPECIFICATION P-D-680. DRY BEFORE APPLYING LUBRICANT.

Figure 4-1. Lubrication Chart (Sheet 2)

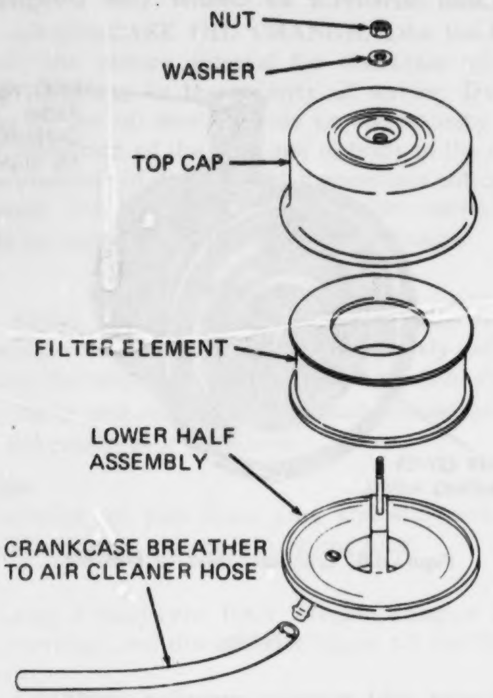


Figure 4-2. Air Cleaner, Exploded View

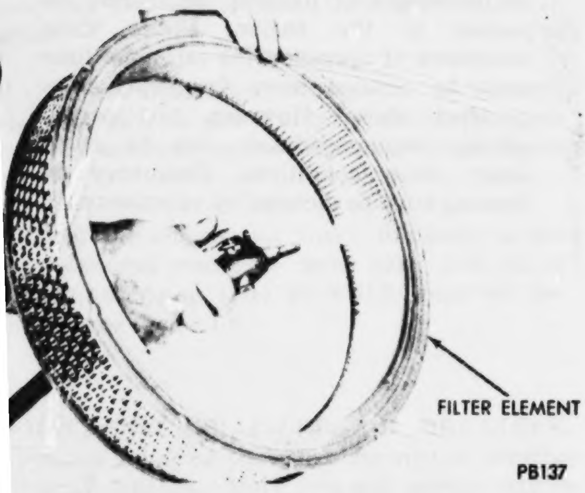


Figure 4-3. Dry Air Cleaner Service (Typical)

·11. CRANKCASE VENTILATION SYSTEM. losed crankcase ventilation is effected by means air drawn into the crankcase through the carbu-tor air cleaner, through the crankcase inlet air eather, circulated through the engine, and drawn it of the cylinder head cover by manifold vacuum to the combustion chambers and dispelled with e exhaust gases.

4-12. The system consists of a breather on the rocker arm cover which draws air from the air cleaner, a PCV valve installed in the rocker arm cover with the outlet tube leading to the carburetor. The function of the PCV valve is to regulate the flow of crankcase fumes at various throttle positions, according to the level of manifold vacuum. See figure 4-4 for component locations.

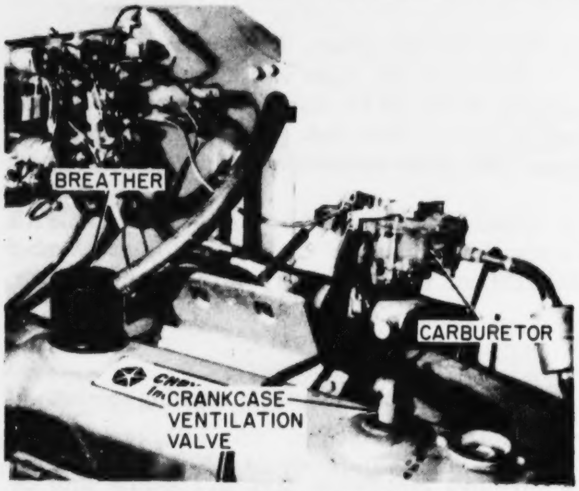


Figure 4-4. Crankcase Ventilation System

4-13. The system will operate effectively as long as normal maintenance is applied. The PCV valve and tube and carburetor are subject to fouling with sludge and carbon formation due to the nature of the materials carried by the ventilating system. A plugged ventilation system may in turn cause excessive engine crankcase sludge formation. It may also cause rough or erratic engine idle or excessive oil leakage. The ventilation system should be serviced as follows:

a. With engine operating at idle speed—

1. Remove PCV valve from rocker cover. If valve is not plugged, a hissing noise will be heard as air passes through the valve, and a strong vacuum should be felt when a finger is placed over the valve inlet.

2. Reinstall the PCV valve, then remove the crankcase inlet air breather. Loosely hold a piece of stiff paper, such as a parts tag, over the opening in the rocker cover.

3. After allowing about a minute for the crankcase pressure to drop, the paper should be sucked against the opening in the rocker cover.

b. With engine stopped, remove PCV valve from rocker cover and shake. If the valve mechanism is free, a clicking noise will be heard.

c. If the ventilation system meets the tests above, no further service is required. If not, the PCV valve should be replaced and the system rechecked. Install a new PCV valve. DO NOT ATTEMPT TO CLEAN THE OLD PCV VALVE.

d. Recheck the system after the new PCV valve is installed. If the paper is not sucked against the opening in the rocker cover with noticeable force, the ventilator hose and the inlet passages in the lower part of the carburetor will have to be cleaned.

e. Clean the carburetor hose with MOPAR Combustion Chamber Conditioner, Part Number 3419126 or equivalent; dry with compressed air.

Note

> Hoses should not remain in cleaning solvent more than 1/2 hour.

f. Remove carburetor, turn a 1/4-inch drill by hand, through the carburetor lower passages to dislodge the solid particles, then blow clean. If necessary, use a smaller drill so that no metal is remvoed. IT IS NOT NECESSARY TO DISASSEMBLE THE CARBURETOR FOR THIS SERVICE.

g. Clean crankcase inlet air cleaner. (See paragraph 4-16.)

h. Clean carburetor air cleaner. (See paragraph 4-10).

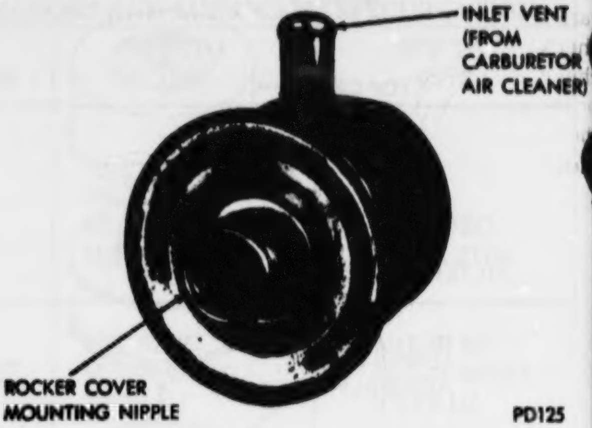

INLET VENT (FROM CARBURETOR AIR CLEANER)
ROCKER COVER MOUNTING NIPPLE
PD125

Figure 4-5. Crankcase Inlet Air Breather

Note

> Under cold weather operating conditions, when the engine is operated at slow speeds with low engine temperatures, more rapid accumulations of harmful fumes may be present in the engine. Under these conditions of operation the valve and tube must be cleaned more frequently than specified above. However, no specific mileage recommendation can be made under these conditions. Frequency of cleaning must be dictated by experience.

14. CRANKCASE OIL CHANGE. Like the air eaner, the service interval for crankcase oil is ried according to the severity of service. Daily ecks of the oil level provide an opportunity to eck condition of the oil. Lack of body in the oil, the presence of dirt and grit suspensions indicate e need for fresh oil. The oil filter cartridge ould be replaced at every second oil change.

15. Drain the crankcase while the engine is at erating temperature, and immediately after utting the engine off. This allows the oil to flow ore freely and carry more dirt and contaminants om the engine as it is drained.

. Remove oil pan drain plug and allow oil to ain thoroughly, before reinstalling plug.

. Using a band-type filter wrench, unscrew the ter cartridge and discard. See figure 4-1 for filter cation.

. Wipe the filter base clean and install a new ter and filter gasket. Screw the filter on until the sket just contacts the base, then tighten 1/2 turn rther.

. Fill the crankcase, through the rocker arm ler cap, with six quarts of oil of the proper grade d type as shown in the lubrication chart, figure 1.

. Start the engine and check for leaks at the ter base and crankcase drain plug. Add oil, if quired, to bring level to FULL mark on the ostick. See figure 4-6.

16 CRANKCASE INLET AIR BREATHER. ean and lubricate the crankcase inlet air breather ery 12 months. More frequent service may be cessary for vehicle operated extensively on short n, stop and go, or extended engine idle service.

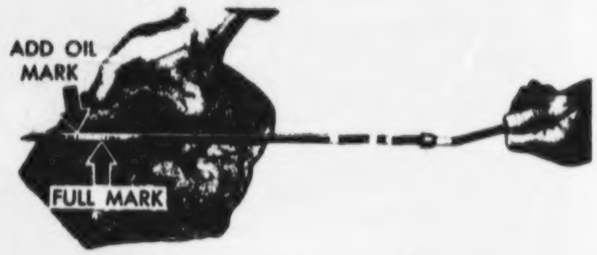


Figure 4-6. Oil Level Indicators

a. Disconnect the hose from the crankcase inlet air cleaner (Figure 4-5). Inspect the hose from the crankcase inlet air cleaner to the carburetor air cleaner and clean if necessary.

b. Remove the crankcase inlet air cleaner and wash it thoroughly in kerosene or similar solvent.

c. Lubricate or wet the filter by inverting the crankcase inlet air cleaner and filling with SAE 30 engine oil.

d. Position the air cleaner to allow excess oil to drain thoroughly through the vent nipple located on the top of the air cleaner.

4-17. MANIFOLD HEAT CONTROL VALVE. Every 100 hours, apply a few drops of heat control valve Solvent, MOPAR Part Number 3419129, or equal, to each end of the shaft at the bearings as shown in figure 4-7. Work the valve back and forth a few times to distribute the solvent evenly over the bearings.

CAUTION

Do not apply solvent to manifold heat control valve when engine is hot. Allow engine to cool at least 30 minutes after running.

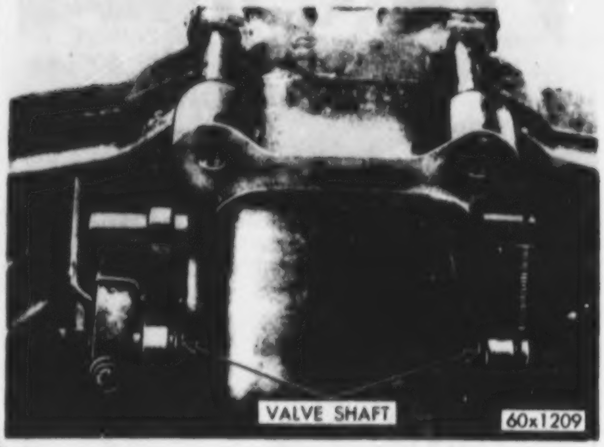


Figure 4-7. Manifold Heat Control Valve

4-18. ALTERNATOR AND WATER PUMP. Both the alternator and water pump feature sealed, permanently lubricated bearings, eliminating the need for periodic lubrication services.

4-19. TRANSMISSION. The initial fluid change for the transmission should be made at 1000 hours of service. Thereafter, the fluid should be completely drained and replaced after each 300 hours of service.

a. Remove drain plug from transmission oil pan. See figure 4-8 for plug location.

b. Remove torque converter access plate, exposing converter drain plug. Remove drain plug, shown in figure 4-8.

c. After torque converter is thoroughly drained, place drain plug and tighten to 90 inch-pounds. einstall access cover.

d. Remove and clean transmission oil pan. iscard old oil pan gasket.

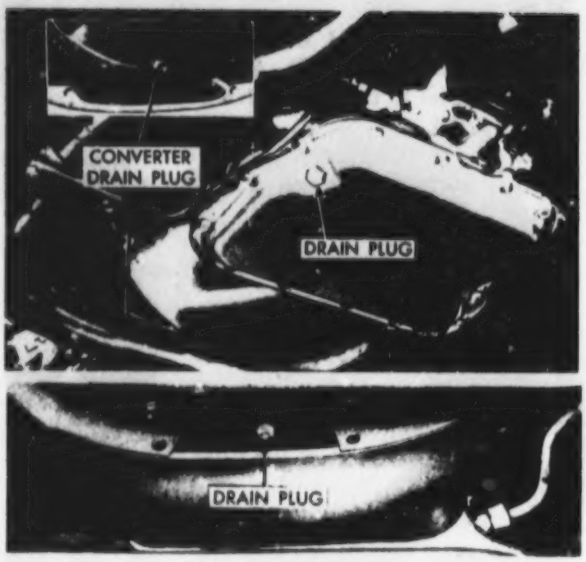


Figure 4-8. Transmission Drain Points

Figure 4-9. Transmission Dipstick Markings

e. Remove and replace intake fluid filter assembly. Torque retaining screws to 28 inch-pounds.

f. Using a new gasket, reinstall oil pan. Tighten oil pan screws to 150 inch-pounds. Install oil pan drain plug and tighten to 288 inch pounds.

g. Fill transmission initially with six quarts of Dexron Type Automatic Transmission Fluid.

h. Start the engine and allow it to idle for at least two minutes. With parking brake securely set, move selector lever through all gear positions and return to neutral.

i. Check fluid level as shown on transmission dipstick (See figure 4-9). Add sufficient fluid to bring the level to the ADD ONE PINT mark.

j. Recheck fluid level after transmission has reached normal operating temperature. The level should be maintained between the FULL and ADD ONE PINT marks on the dipstick. Check carefully for leaks at the oil pan flange and drain plugs.

CAUTION

To prevent dirt from entering the transmission, make certain that the dipstick is properly seated on the filler tube.

4-20. REAR AXLE AND REDUCTION GEARCASE. At least annually, the rear axle differential and reduction gearcase should be drained and refilled with new lubricant. Drain the units while they are hot, preferably just after a run. Refill only with the type and grade of lubricant specified in figure 4-1, Lubrication Chart.

4-21. FRONT WHEEL BEARINGS. The front wheel bearings should be inspected and repacked annually, or every 1200 hours of operation.

a. Raise the front of the vehicle by hoisting or jacking until the front wheels clear the ground.

b. Refer to figure 4-10 and remove the six screws and lockwashers securing the grease cap to the hub.

c. Bend up locking tang on bearing nut lockwasher (2, figure 4-11) and loosen and remove locknut (1) and adjusting nut (3).

d. Pull off the front wheel and hub (6). Outer bearing cone (4) will be forced off as wheel is removed.

e. Clean bearing cones (4 and 7) by washing thoroughly in solvent, Specification P-D-680, and allowing to air dry. Do not spin bearings dry with compressed air.

f. Clean out all old grease from the hub, and repack the inside of the hub with clean grease, MIL-L-10924. Pack bearing cones flush with rollers before reinstalling.

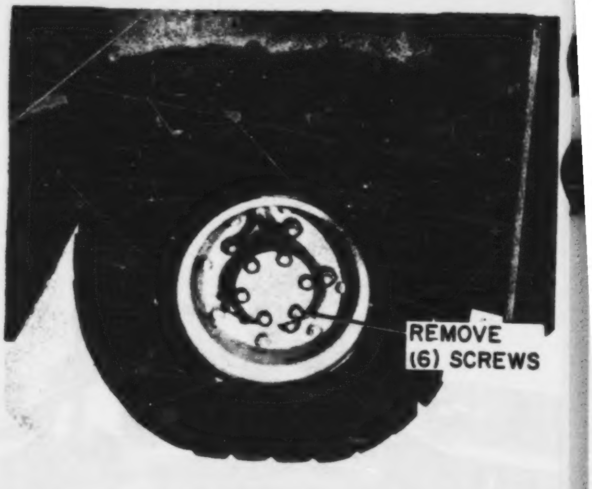
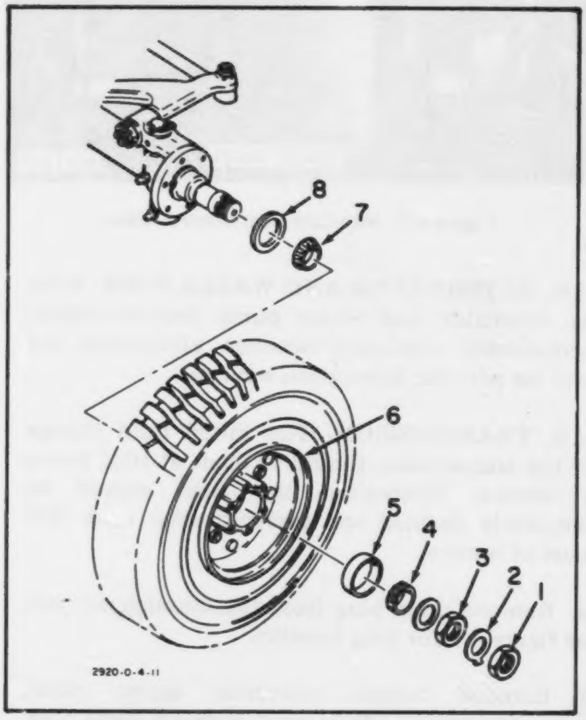


Figure 4-10. Front Wheel Grease Cap Removal



1. Locknut
2. Lockwasher
3. Adjusting nut
4. Outer bearing cone
5. Outer bearing cup
6. Wheel and hub
7. Inner bearing cone
8. Grease seal

Figure 4-11. Front Wheel and Bearings

g. Reinstall hub and bearings as shown in the illustration, figure 4-11. Install adjusting nut, lockwasher and locknut, but do not tighten.

h. Perform wheel bearing adjustment as outlined in paragraph 4-86.

i. Reinstall grease cap and secure with the six screws and lockwashers as shown in figure 4-10.

4-22. REAR WHEEL BEARINGS. Once a year or every 1200 hours of operation, check and relubricate rear wheel bearings as follows:

a. Raise rear wheels clear of the ground.

b. Remove cotter pin and hex castellated nut from end of axle shaft as shown in figure 4-12.

c. Remove wheels and tires, wheel hub and brake drum as a unit, from free end of axle shaft.

d. Remove the six screws and lockwashers around the perimeter of the seal retainer, and remove the seal retainer, seal, and shims as shown in figure 4-13.

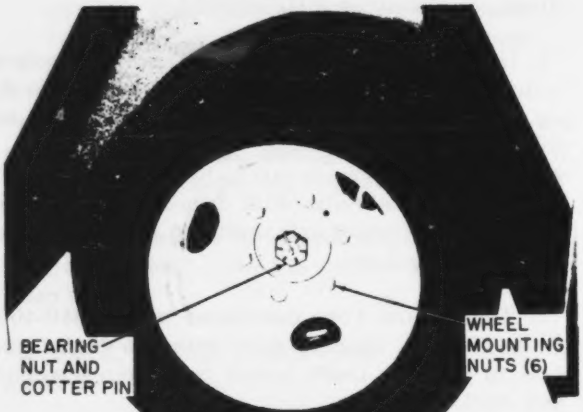

BEARING NUT AND COTTER PIN
WHEEL MOUNTING NUTS (6)

Figure 4-12. Removal of Rear Wheel and Drum

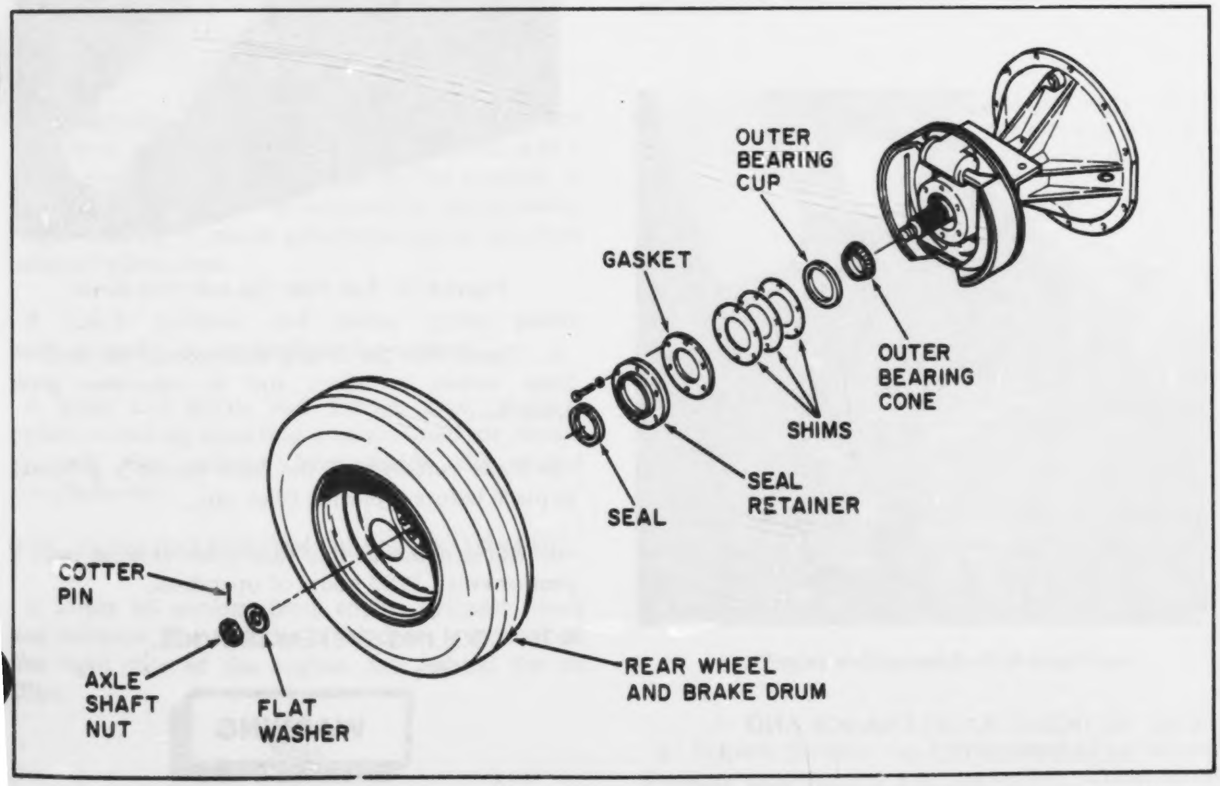

OUTER BEARING CUP
GASKET
OUTER BEARING CONE
SHIMS
SEAL RETAINER
SEAL
COTTER PIN
AXLE SHAFT NUT
FLAT WASHER
REAR WHEEL AND BRAKE DRUM

Figure 4-13. Rear Wheel and Bearings

e. Remove the outer bearing cone, clean out the bearing cavity and pack bearing and cavity with grease, Specification MIL-L-10924.

f. Install outer bearing cone and cup, and replace outer seal, seal retainer, and shims, securing with six capscrews and lockwashers. Torque screws to 30 foot-pounds.

g. Install wheel hubs (with drum, wheel and tire attached) on ends of axle shaft and secure with the large castellated nut.

h. Tighten the large castellated nut to 350-400 ft.-lbs. torque, aligning slots with the cotter pin hole in the axle shaft. Install cotter pin thru nut and shaft.

4-23. STEERING GEAR. The lubricant level in the steering gear should be checked quarterly and the level brought up to the level of the filler plug hole as necessary. The filler plug is accessible after removing the left side floor plate and battery cover, as shown in figure 4-14. Use MIL-L-2105 Gear Oil (1-1/2 pints) when refilling.

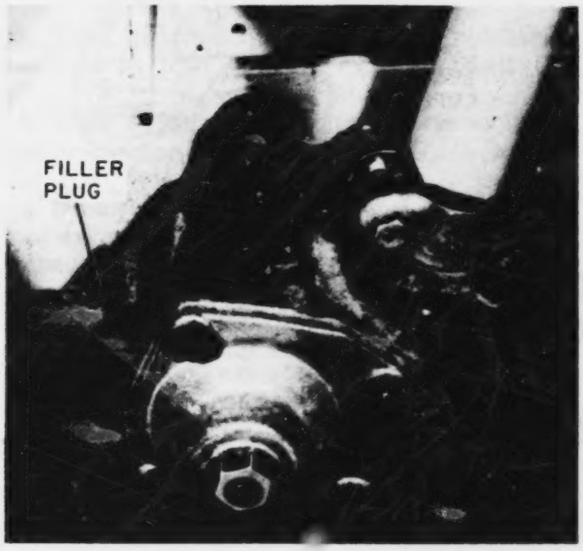


Figure 4-14. Steering Gear Filler Plug

4-24. PERIODIC MAINTENANCE AND ADJUSTMENTS.

4-25. FUEL SYSTEM SERVICE. The fuel system should be checked periodically for leakage at tube fillings and hose connections, and the fuel filter replaced, according to the schedule established in Table 4-2.

WARNING

Make certain that no spark or open flame exists in the work area, and that no smoking is permitted while servicing the fuel system.

a. Refer to figure 4-15 and remove fuel filler safety cap and filter screen with O-ring seal. Check condition of filter screen and clean as required.

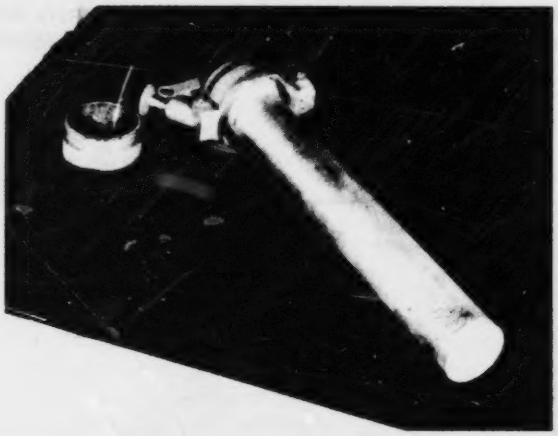


Figure 4-15. Fuel Filler Cap and Filter Screen

b. Check that the O-ring seal around the neck of filter screen is intact and in otherwise good condition.

c. Make certain that the filter screen is properly in place before replacing filler cap.

d. Replace the in line fuel filter at least once a year or every 1200 hours of operation.

4-26. COOLING SYSTEM SERVICE.

WARNING

This vehicle is equipped with a pressurized cooling system. Use extreme care when removing the radiator cap if the engine has recently been operating. The sudden release of pressure can cause sudden boiling of the coolant and a dangerous steam flash. Always loosen the cap slowly and allow the pressure to vent off slowly before removing cap.

a. Remove radiator cap slowly, and check coolant level. The coolant level should be checked with the engine shut off.

b. Make sure coolant reaches the full mark on side of radiator, or no more than 2 inches below top of filler neck. If level is low, add sufficient clean water (or antifreeze) to bring level up.

CAUTION

Never pour cold water or cold anti-freeze solution into the radiator of an overheated engine. Allow the engine to cool and avoid the danger of cracking the cylinder head or block. Keep the engine running while adding water or anti-freeze. When using ethylene-glycol (permanent-type) anti-freeze, the solution must contain a minimum of 40% water.

c. Use only clean water, or clean water and anti-freeze solution, in refilling the radiator. Add 1 ounce per gallon of soluble oil to the coolant. If the truck is likely to be exposed to temperatures lower than 32°F, check anti-freeze protection level using a hydrometer.

d. Check radiator and water pump gasket surfaces and hose connections for leakage.

e. Blow out debris and foreign material from radiator core by directing a compressed air stream through the radiator from inside the engine compartment.

4-27. COOLING SYSTEM DRAIN AND REFILL.

a. Drain all coolant from engine cylinder block and radiator. The cylinder block drain is located on the right side of the engine, just behind the oil filter.

Note

Draining of cooling system is most effective when the engine has just been operating, as the combination of heat and circulation of the water will hold some of the sediment in suspension, to be drained off with the coolant. Disconnecting the lower radiator hose will allow larger particles of sediment and scale to be drained off.

b. Close cylinder block and radiator drains and refill cooling system, adding cleaning compound, Military Specification MIL-C-10597.

c. Operate engine for approximately 15 minutes, then completely drain the system and flush with clean water.

d. Refill cooling system with clean water or anti-freeze solution.

e. Operate engine and check for leaks at radiator, water pump gasket surfaces, and hose connections. Recheck coolant level as engine will expel trapped air while operating.

f. Check radiator cap gasket surfaces, and replace cap if sealing surface appears cracked, broken or deteriorated. See figure 4-16.

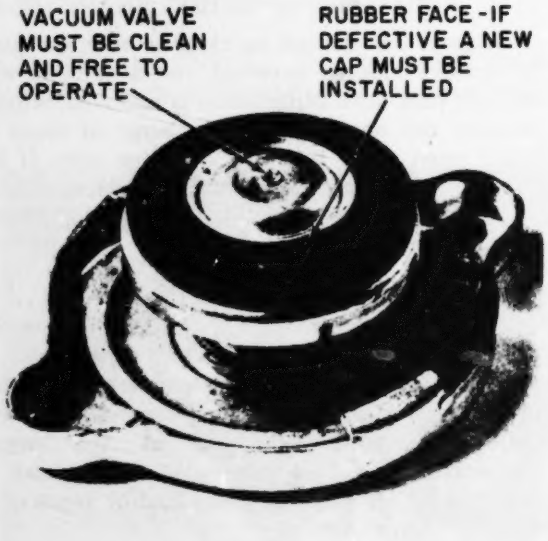

VACUUM VALVE MUST BE CLEAN AND FREE TO OPERATE
RUBBER FACE - IF DEFECTIVE A NEW CAP MUST BE INSTALLED

Figure 4-16. Radiator Cap Inspection

g. Inspect pressure cap for freedom of operation. Pressure caps employ a spring loaded, rubber-faced valve which presses against a seat in the radiator top tank. Pressure caps employ a vacuum valve held against its seat under spring pressure, which should be checked for free movement.

Note

If a new cap is required, always install a cap of the same type and pressure rating, (7 lb.).

h. The radiator pressure relief valve can be tested for proper operation by means of the cooling system tester shown in figure 4-17. This device comes equipped with adapters so that it can be used to check the radiator and the radiator cap.

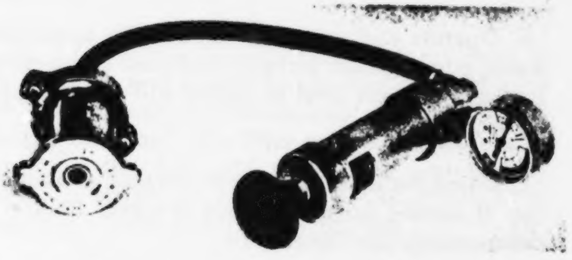


Figure 4-17. Cooling System Tester

i. Inspect for dented or clogged overflow pipe. To remove clogged material, run a flexible wire through pipe until obstruction is removed. When a pressure cap opens the sudden surge of vapor or liquid must press thru the overflow pipe. If the pipe is dented or clogged, the pressure developed by the obstruction may cause damage to radiator or hoses.

4-28. THERMOSTAT TEST AND REPLACEMENT. An engine which runs too hot or too cold will not perform properly, will lack power, and create more maintenance problems than an engine operating at the proper temperatures. If the thermostat is suspected of being faulty, it may be tested and/or replaced as follows:

CAUTION

Never run the engine with the thermostat removed. Removal of thermostat will allow water to bypass the radiator and circulate only through the engine, causing serious overheating and resultant engine damage.

a. Drain the cooling system as outlined in paragraph 4-27.

b. Remove the bolts which retain the water outlet elbow and thermostat housing as shown in figure 4-18.

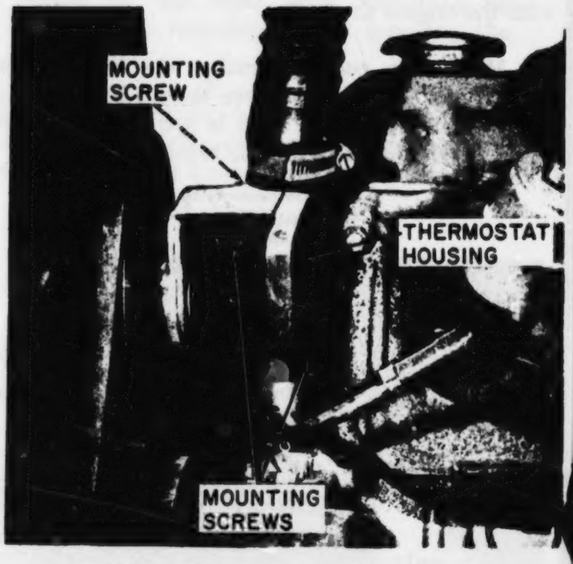


Figure 4-18. Thermostat Housing

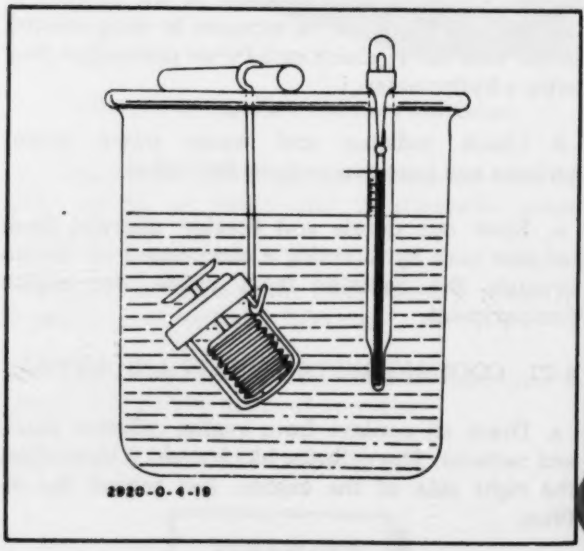


Figure 4-19. Thermostat Test

c. Remove thermostat by pulling out from housing.

d. Hang the thermostat in a pan or glass beaker, so that no part of the thermostat touches the bottom or sides of the container. See figure 4-19. Also suspend in the water a thermometer of known accuracy, having a range of at least 250°F.

e. Heat the water to 158°F, and observe action of bellows in the thermostat as water temperature is raised an additional 10°F at a time, pausing at 168°F, 178°F, and 188°F for one minute to check if thermostat is beginning to open.

f. If thermostat starts to open before 175°F or doesn't open until 185°F, it is defective and must be replaced. Thermostat should be fully open at 202°F.

g. Install thermostat, new gasket, and thermostat housing and outlet elbow to the cylinder head and tighten attaching screws securely. Gasket sealer should be used to insure a leak-free mounting.

Note

Scrape or otherwise remove all residue of old gaskets and sealer before installing new gaskets.

4-29. FAN, WATER PUMP, AND ALTERNATOR BELT ADJUSTMENT. The adjustment of the alternator drive belt should be checked periodically and adjusted if found to be excessively tight or loose. Too tightly adjusted belts cause early bearing failure in the alternator. Belts that are too loose cause engine overheating and low battery charge.

a. Check belt tension by applying finger pressure (approximately 25 lbs. force) to point "A" shown in figure 4-20. The belt should deflect 1/2 to 3/4 inch under the pressure.

b. Try rotating the fan by pulling on one of the blades with one or two fingers. If the fan can be rotated in this manner, the belt is too loose.

c. Loosen the adjusting bolt and the mounting bolt shown in figure 4-20.

d. Move alternator away from engine to tighten the belt, or toward engine to loosen belt tension. When correct tension is obtained by the method described in step a, tighten the adjusting bolt (4 foot/pounds) and the mounting bolt (7 foot/pounds.

CAUTION

When tightening belt tension, apply pressure against the stator laminations between the end frames and not against either end frame. When adjusting for deflection, pull alternator by hand. Do not use a pry bar. Exercise caution when adjusting belts. Belts adjusted too tight will very likely cause bearing damage. Conversely, belts adjusted too loose will result in belt wear and high engine temperature due to belt slippage.

e. Check water pump belt tension by applying 25 pounds force to water pump belt, midway between pulleys. The belt should deflect 3/8 to 1/2 inch.

f. If tension requires adjustment, loosen the adjusting bolt on the idler bracket at the lower right front of timing gear case, and move the idler bracket outward to increase belt tension.

g. Tighten adjusting bolt securely when the proper tension has been reached.

4-30. BRAKE SYSTEM MAINTENANCE.

4-31. PEDAL CHECK. The following checks should be made during each 50 hour maintenance

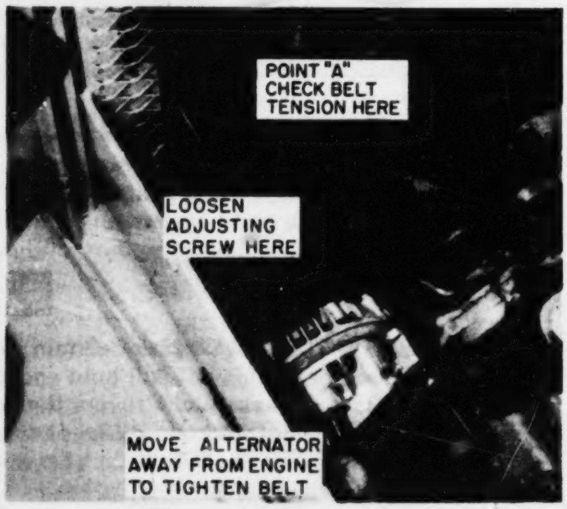


Figure 4-20. Fan and Alternator Belt Adjustment

interval, and appropriate adjustments or repairs made when necessary.

a. Depress the brake pedal, and hold under pressure for ten seconds. Pedal must feel solid, not spongy, and no leak down or "drift" should be noticed.

b. Check pedal free play (pedal motion before resistance is felt from master cylinder). This free play should be 1/8 to 3/8 inches. Loosen and rotate the eccentric bolt in the power unit push rod to obtain the proper pedal free play.

4-32. MASTER CYLINDER CHECKS. The master cylinder should be checked whenever pedal travel adjustments are made. The master cylinder filler cap is accessible by removing the button plug in the floor plate just to the right of the operators seat. Proceed as follows:

a. Check the fluid levels within the master cylinder. The fluid level should be within 1/4 inch from the top of the filler neck. Use only SAE 70 R3 Heavy Duty Hydraulic Brake Fluid, when adding fluid.

b. Check the master cylinder filler cap vent holes. These vents must be open at all times, to allow proper fluid movement within the master cylinder. If necessary, use a fine wire or small drill to clear the vent of any obstruction.

c. Always make certain that pedal adjustments are properly made, as improper pedal up-height will cause the internal porting in the master cylinder to be blocked so that fluid will be trapped, under pressure, in the brake lines. This fluid can hold the linings in constant contact with the drums, causing excessive lining wear and fuel consumption.

4-33. BLEEDING BRAKE SYSTEM. Whenever the brake system is opened for any reason, such as repairs to master cylinder, wheel cylinder, or brake lines, air will enter the brake system and must be expelled through the bleeding procedure outlined in the following paragraphs.

4-34. PRESSURE BLEEDING. Make certain that the pressure bleeding equipment will hold enough of the right type of brake fluid to do the job (about 2 quarts). Do not intermix different types of brake fluid, and never reuse fluid that has been drained from the brake system.

WARNING

Make certain that pressure bleeder tank is certified for use under pressures exceeding 30 psi before using.

a. Clean all dirt, grease, etc., from around the master cylinder reservoir cap.

b. Remove the master cylinder reservoir cap and fill reservoirs with SAE 70 R3 Heavy Duty Hydraulic Brake Fluid to within 1/4 inch from the top of the reservoirs.

c. Fill the pressure bleeder reservoir with about 2 quarts of the same fluid, and pressurize the tank to not more than 30 psi.

d. Place a flat pan under the bleed point to catch brake fluid spillage, and connect the pressure bleeder line to the brake master cylinder. Open the pressure bleeder valve.

e. Refer to figure 4-21 for identification of the rear axle bleed points within the brake system.

f. When bleeding front or rear wheel cylinders, attach a small hose to the bleeder screw on the wheel cylinder, submerge the other end of the hose into a jar of clean brake fluid. Hold the jar at a point higher than the bleeder screw, and open the bleeder screw, allowing fluid to flow into the jar until no more bubbles can be seen in the flow as shown in figure 4-22.

g. With the bleeder hook-up completed, open bleed point 3 (Tee fitting) shown in figure 4-21, and allow fluid to flow from loosened fitting, until no further bubbles appear in the flow. Tighten fittings securely when all air is expelled.

h. When air bubbles stop coming into the container, close the bleeder fitting and remove the tube. Close bleeder tank valve.

i. Disconnect bleeder tank line from master cylinder.

j. When bleeding operation is completed, fill master cylinder to within 1/4 inch from the top.

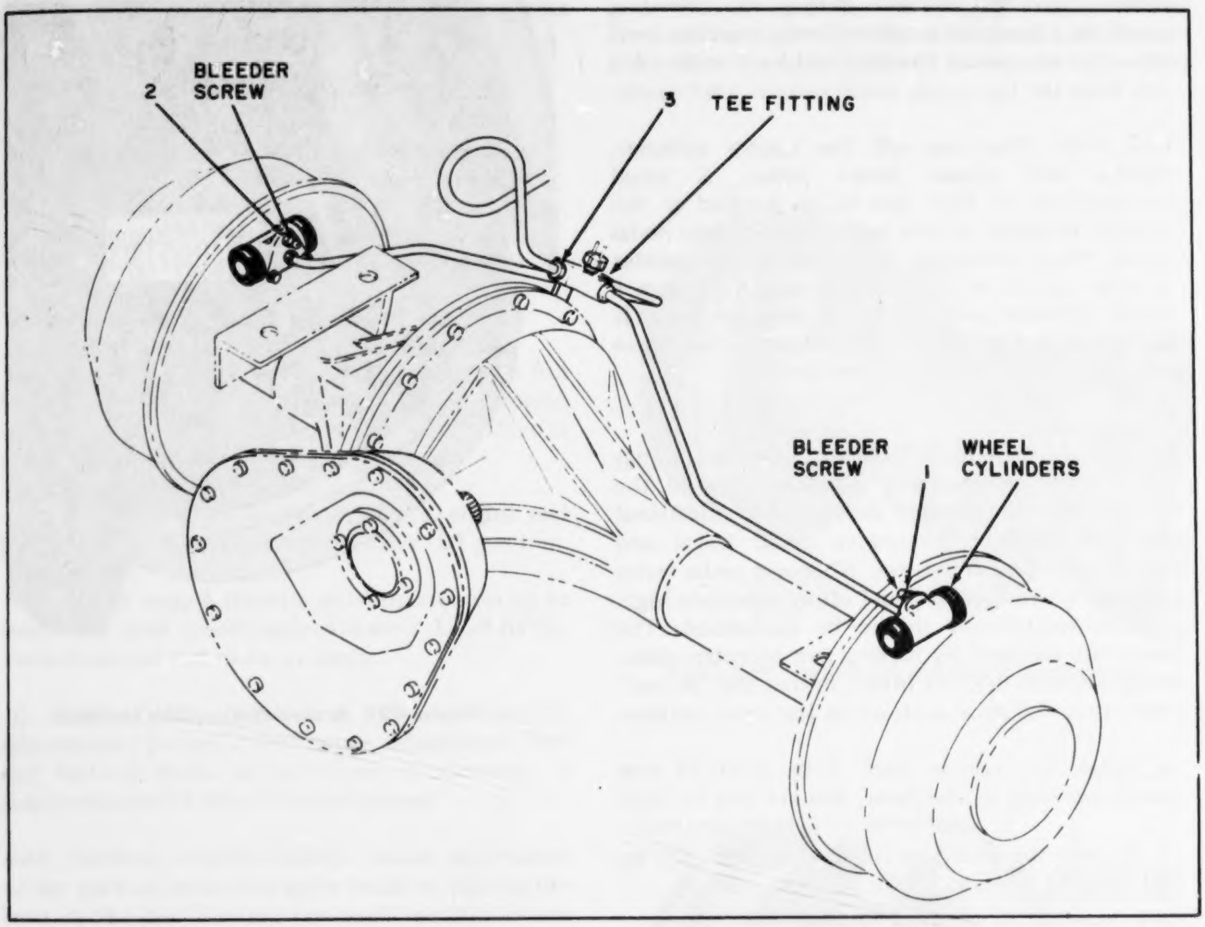

2
BLEEDER SCREW
3
TEE FITTING
BLEEDER SCREW
1
WHEEL CYLINDERS

Figure 4-21. Brake System Bleed Points, Rear Axle

WARNING

Always relieve pressure from bleeder tank when bleeding operation is completed.

4-35. MANUAL BLEEDING. Manual bleeding may be performed when pressure bleeding equipment is unavailable. Manual bleeding will require two men, one to depress and hold the brake pedal while the other opens and closes the bleeder valves. Proceed as outlined under pressure bleeding, but observe the following special instructions.

4-36. It must be remembered that the brake pedal should be depressed slowly and held until the line connections or bleeder screws are securely tightened. This prevents the possibility of air being

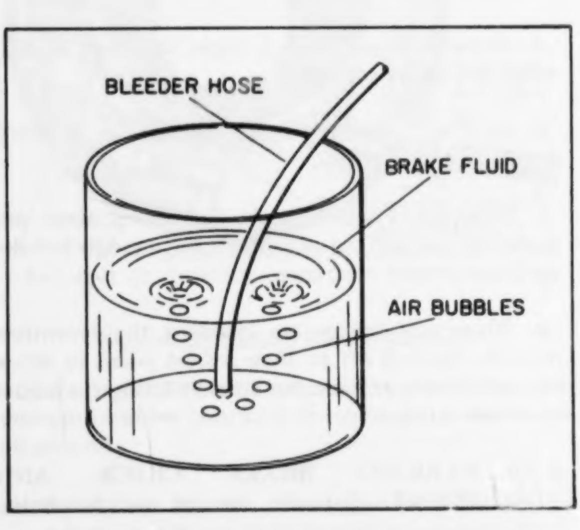

BLEEDER HOSE
BRAKE FLUID
AIR BUBBLES

Figure 4-22. Bleeder Jar

drawn into the system during the bleeding operation. Check the master cylinder reservoir level often during manual bleeding and keep within 1/4 inch from the top.

4-37. With filler cap off the master cylinder, depress and release brake pedal. A small displacement of fluid should be noticed in the cylinder reservoir. If this happens, the brake pedal (upon being released) is returning the master cylinder piston to its normal position to open a master cylinder port. This port must be open. If fluid is not displaced upon releasing the brake pedal, a pedal adjustment is required.

4-38. BRAKE ADJUSTMENT. As brake linings wear, additional clearance develops between the linings and the brake drum. This additional clearance results in excessive pedal travel and reduced brake effectiveness. Whenever pedal travel becomes excessive and pedal effort relatively high, a brake adjustment should be performed. The brakes are adjusted by turning two eccentric cams, which are built into the brake, so that the "at rest" position of the shoe is closer to the drum surface.

a. Raise the vehicle until both front or rear wheels are clear of the floor, and are free to turn.

b. Locate the two hex head adjusting bolts on each backing plate, as shown in figure 4-23.

c. Using a 15/16 inch open end wrench, turn each bolt in the direction indicated in figure 4-24, to expand shoes.

d. Expand shoes until a slight drag can be felt while drums are rotated

e. Back off adjusting bolts just enough to allow drums to rotate freely.

f. Subsequent adjustments for lining wear are made by turning the eccentrics far enough to take up the excessive clearance.

g. When new linings are installed, the eccentrics must be backed off to their lowest point to allow enough clearance over the thicker linings to adjust the brake drums.

4-39. PARKING BRAKE CHECK AND ADJUSTMENT. Periodic checks to determine

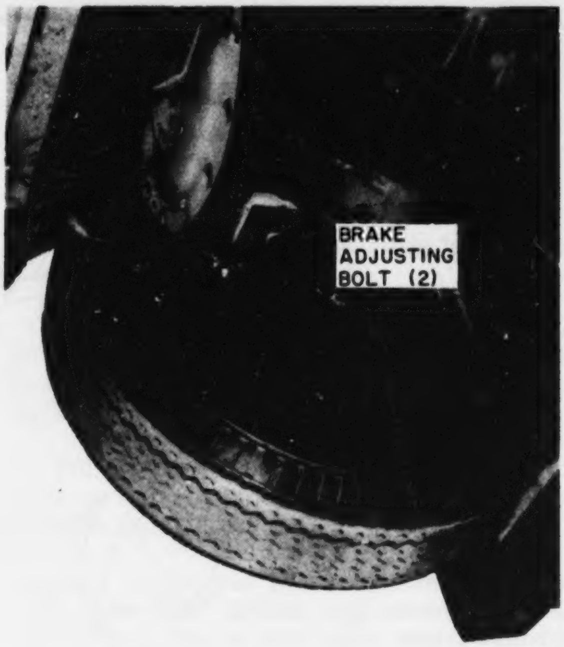


Figure 4-23. Brake Adjusting Bolt Location

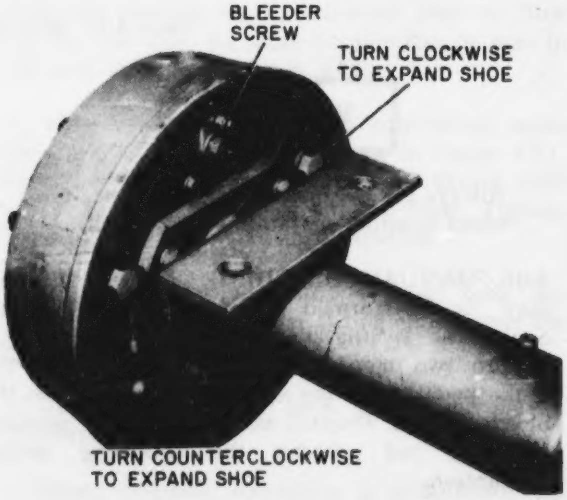


Figure 4-24. Brake Adjustment

efficiency of the parking brake are to be made as described below.

Note

The parking brake must be capable of holding truck, with rated capacity load (40,000 lb.), on a 15% grade. If a major adjustment as described in paragraph 4-41 will not restore proper operation, the parking brake linings should be replaced. See Section V.

a. Fully apply hand brake, moving lever from full forward to full rearward position. Cable tension should be sufficient to require a definite effort in pulling the lever over the center position.

b. With hand brake set, start vehicle engine and place gear range selector lever in drive (D) position.

c. Depress engine throttle until engine runs up to maximum stall speed (approximately 1500 RPM). Vehicle should not move or creep.

d. If either of the above tests indicate a need for adjustment, perform the minor adjustment first and recheck brake action. Then, if necessary, a major adjustment should be performed.

4-40. MINOR ADJUSTMENT. Minor adjustment to the parking brake linkage is made by placing the lever in the full forward (released) position, then turning the knurled knob on the end of the lever several turns clockwise. After making this adjustment, recheck brake action as described above. If necessary, repeat adjustment.

Note

If brake effectiveness cannot be restored within the range of travel of the lever knob, a major adjustment must be performed.

4-41. MAJOR ADJUSTMENT. When minor adjustment is not sufficient to restore brake efficiency, a major adjustment should be performed as outlined below:

a. Release hand brake lever, returning lever to the full forward position.

b. Working from underneath the vehicle, loosen screws holding access plate onto brake backing plate. Slide cover to one side and pivot down out of the way (see figure 4-25).

c. With access plate removed, adjusting screw and nut will be exposed as shown in figure 4-26. Rotate the adjusting nut clockwise to expand shoes until shoes fully contact brake drum.

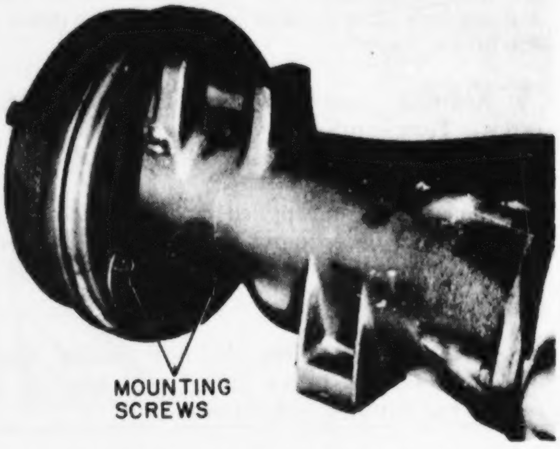


Figure 4-25. Parking Brake Adjuster Access Plate

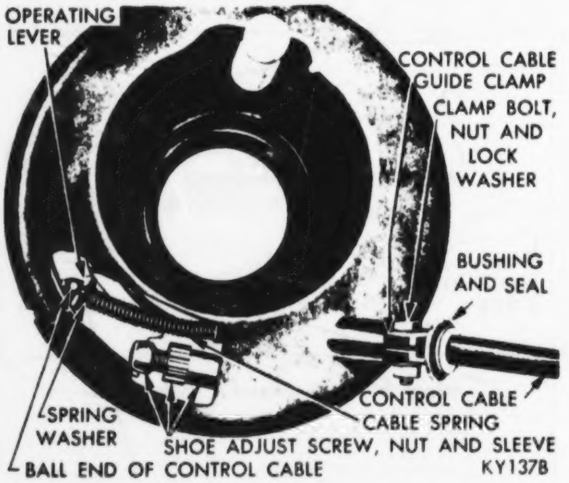

OPERATING LEVER
CONTROL CABLE GUIDE CLAMP
CLAMP BOLT, NUT AND LOCK WASHER
BUSHING AND SEAL
CONTROL CABLE
CABLE SPRING
SPRING WASHER
SHOE ADJUST SCREW, NUT AND SLEEVE
BALL END OF CONTROL CABLE
KY137B

Figure 4-26. Parking Brake Adjustment

d. Back off the adjusting nut six notches, just enough to allow clearance between drum and shoes all around.

Note

Be certain the two raised shoulders on the adjusting nut are fully seated in grooves of adjusting sleeve.

e. Cable guide clamp (figure 4-26) should be loosened, and cable positioned so that a clearance of 0.005 to 0.010 inch exists between ball end of cable and operating lever.

f. After clearance is obtained, tighten cable guide clamp bolt, nut, and lockwasher and seat the cable nut securely against cable housing on the inside of the brake.

g. Reinstall cover plate, and tighten mounting screws. Turn knurled knob on top of brake lever to take up all slack in the brake cable.

h. Place lever in applied position (a definite effort should be required to move the lever over the center position). Check brake effectiveness as outlined in paragraph 4-39.

i. If these procedures do not restore brake effectiveness, the brake linings will have to be replaced as outlined in Section V.

4-42. ELECTRICAL SYSTEM.

4-43. **BATTERY MAINTENANCE.** The battery is the heart of the electrical system. It does not produce electricity, but merely stores it, through chemical action, until such time as it is needed. In order for the battery to render its maximum service, it must be properly cared for, according to the following instructions.

a. Check battery electrolyte level frequently, especially in hot weather. Maintain the level at 1/4 to 1/2 inch over the top of the plates by adding distilled water, when necessary.

WARNING

Never allow sparks or open flame in the area when checking the battery. Storage batteries produce hydrogen, an explosive gas, as a normal by-product of operation.

b. Hydrometer readings should be used to determine the battery state of charge. This is particularly true in cold weather, as a partially discharged battery may freeze at temperatures up to 20°F.

c. Take readings on the hydrometer as shown in figure 4-27. Battery will need charging if the specific gravity reads 1.225 (or less) at 75°F. Correct the hydrometer reading according to the

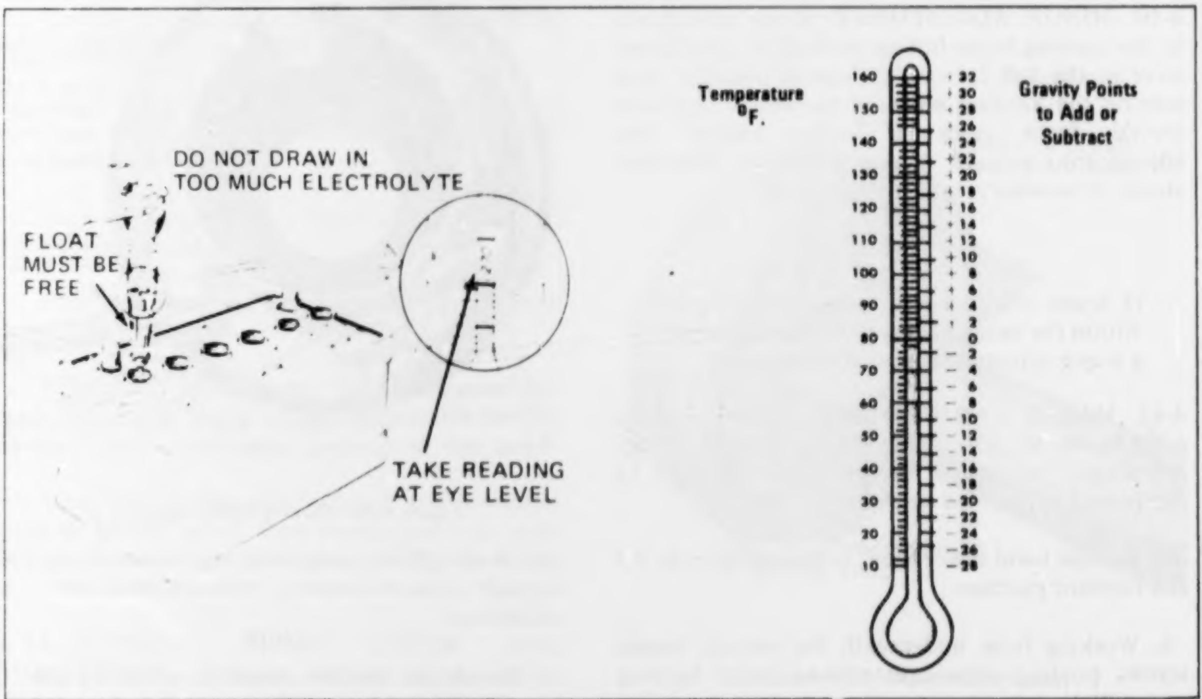

DO NOT DRAW IN
TOO MUCH ELECTROLYTE
FLOAT
MUST BE
FREE
TAKE READING
AT EYE LEVEL
Temperature
°F.
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
Gravity Points
to Add or
Subtract
+32
+30
+28
+26
+24
+22
+20
+18
+16
+14
+12
+10
+8
+6
+4
+2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28

Figure 4-27. Checking Battery Specific Gravity

c. Check all battery cable connections periodically to make sure they are clean and tight.

d. Remove any corrosion from battery terminals by scrubbing with a solution of baking soda, or ammonia, and water.

e. Good cable connections can be further ensured by cleaning battery posts with a cleaning tool as shown in figure 4-28, and cleaning the inside surfaces of the cable terminals as shown in figure 4-29.

f. After cleaning, coat the exterior of the cable terminals with a light film of vaseline to retard further corrosion.

4-44. BATTERY TESTS. Take readings on the hydrometer as shown in figure 4-27. Battery will need charging if the specific gravity reads 1.225 (or less) at 75°F. Correct the hydrometer reading according to the ambient temperature as shown by figure 4-27.

CAUTION

Specific gravity should be 1.265 or greater if battery is exposed to freezing temperatures. If machine is operated in tropical climates where no freezing weather is encountered, the full charge specific gravity may be lowered from 1.375 to 1.225 by diluting the electrolyte with distilled water.

Note

Do not add distilled water to electrolyte immediately after charging the battery.

4-45. HARD-TOP BATTERIES. Checking individual cell voltage on newer batteries with the completely enclosed "hard-top" case is not possible. Use the tests described in paragraph 4-46 to determine battery condition.

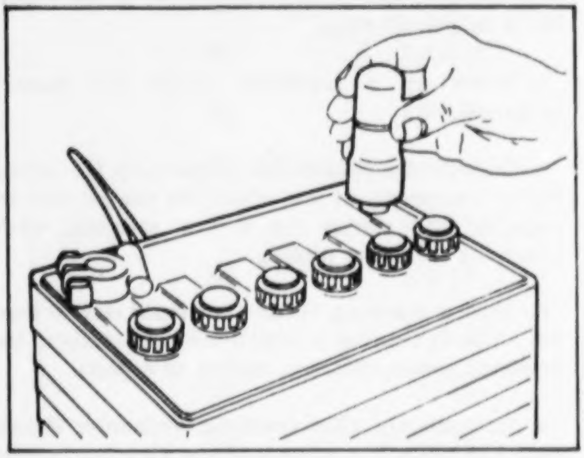


Figure 4-28. Cleaning Battery Posts

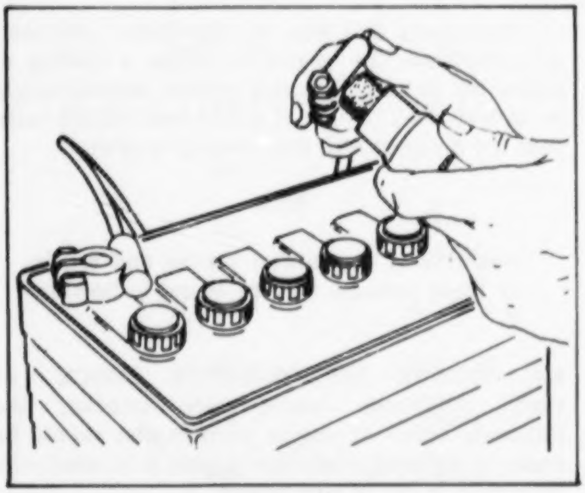


Figure 4-29. Cleaning Cable Terminals

4-46. STARTING/CHARGING SYSTEM TESTS. The following test will help in localizing any problem within the alternator, starter or battery:

a. Disconnect the high tension coil wire from the distributor cap. Clip a jumper lead onto the coil wire terminal and ground the jumper to the engine block or ground strap.

b. Hook up a voltmeter across the battery terminals.

c. Depress the accelerator pedal fully (to obtain higher compression) and crank the engine over by engaging the starter for a few seconds, while observing voltmeter reading.

d. During cranking, voltmeter should read at least 9.6 volts. If reading is low, a problem exists in the cranking system (battery, starter, or cables).

e. Immediately after cranking, voltmeter should read 12+ volts. If reading is below 12 volts, battery is defective or under-charged.

f. Reconnect coil wire to distributor, and start and accelerate the engine to obtain a reading of alternator output. Charging system output should be at least 12-1/2 volts. If not at least 12-1/2 volts, then the problem is in the charging system.

Note

Instructions for further testing and repair of these systems may be found in Section V.

4-47. ENGINE PERFORMANCE CHECK. At every 1200-hour maintenance interval, the following check of engine performance should be made to determine whether engine is in need of a tune-up or is out of adjustment.

a. Before making check, run engine until unit is at operating temperature. This is important as the transmission oil temperature should be 200 degrees F. and the engine water jacket should be at operating temperature. Apply parking brake.

b. With the engine operating at idle and the transmission in NEUTRAL, check the fluid level on the dipstick. Fill, if necessary, to the FULL mark on the dipstick, using Dexron Automatic Transmission Fluid (fluid containers must display a qualification number (2848A) prefixed by "AQ-ATF").

c. With a tachometer, check engine for governed speed at full throttle. The unloaded engine RPM should be set at 2600 RPM.

CAUTION

The following procudure requires full power stalling of the converter. Prolonged stalling of the converter can cause internal damage to the converter. Stall converter only long enough to attain the peak RPM reading — maximum 30 seconds.

d. Position tractor against an immovable object, or, if parking brake linings are reasonably new, apply parking brake to prevent forward motion of vehicle. Move gear selector to forward drive (D) range, and accelerate engine to full throttle while observing tachometer reading. Normal full power stall is 1450 to 1600 RPM.

e. If stall speed readings are too low, the engine is lacking in power and requires a tune-up or other corrective measures. If stall speeds are too high, slippage within the transmission is indicated. Refer to Section V for transmission repair procedures.

4-48. ENGINE TUNE-UP.

4-49. Engine tune-up is the orderly and systematic process of checking the engine and accessory equipment to maintain or restore satisfactory engine performance. Engine tune-up must be accomplished semi-annually and more frequently if engine performance indicates the need for these services. Perform engine tune-up as outlined in the following paragraphs after checking the following items:

a. Air Cleaner: be sure air cleaner has received

TABLE 4-3. TORQUE VALUES

	Torque Foot-Pounds	Thread Size
Connecting Rod Nut	45	3/8-24
Cylinder Head Bolt	65	7/16-14
Main Bearing Cap Bolt	85	1/2-13
Spark Plug	30	Long Reach—14mm
Camshaft Lockbolt	35	7/16-14
Carburetor to Manifold Nut	30	3/8-16
Chain Case Cover Bolt	200 in.-lbs.	5/16-18
Clutch Housing Bolt	30	3/8-16
Crankshaft Rear Bearing Seal Retainer	30	3/8-16
Cylinder Head Cover Bolt	40 in.-lbs.	1/4-20
Distributor Clamp Bolt	200 in.-lbs.	5/16-18
Engine Front Mounting to Frame Nut	85	1/2-20
Engine Front Mounting to Block Nut	45	7/16-20
Engine Rear Mount Bolts	35	7/16-14 3/8-24
Exhaust Manifold Nut	10	5/16-24
Exhaust Pipe Flange Nut	30	7/16-20
Exhaust Pipe Clamp Bolt	20	3/8-24
Exhaust Pipe Support Clamp Bolt	20	3/8-24
Fan Attaching Bolt	200 in.-lbs.	5/16-18
Fuel Pump Attaching Bolt	30	3/8-16
Alternator Bracket Bolt	30	3/8-16

proper service. Air cleaner must be installed before making engine tune-up.

b. Fuel Pump: be sure the fuel line filter has been properly serviced and the fuel pump is operating satisfactorily.

c. Torque Values for Threaded Fasteners: Engines have many studs, bolts, screws, and nuts of special material and varying sizes and it is very important to see that all such fasteners are torqued to the proper values in order that the engine will be restored to its original efficiency. Refer to Table 4-3 for torque ratings of various fasteners.

4-50. IGNITION SYSTEM. All tractors are equipped with the Chrysler Electronic Ignition System (Figure 4-30).

The dual ballast resistor and the control unit are mounted on a bracket attached to the engine valve cover.

The primary circuit consists of the battery, ignition switch, compensating (0.5 ohm) side of the ballast resistor, primary windings of the ignition coil, power switching transistor of the control unit and the vehicle frame.

The secondary circuit consists of the coil secondary windings, distributor cap and rotor, spark plug wires, spark plugs, and vehicle frame.

The compensating resistance maintains constant primary current with variation in engine speed. During starting this resistance is by-passed, applying full battery voltage to the ignition coil.

In addition to the two basic circuits there are three other circuits. They are the pick up coil circuit, control unit feed circuit, and auxiliary ballast circuit.

Two circuits are used to operate the circuitry of the control unit. These are the auxiliary ballast circuit which uses the 5 ohm section of the dual ballast resistor and the control unit feed circuit.

The pick up circuit is used to sense the proper timing for the control unit switching transistor.

The reluctor rotating with the distributor shaft produces a voltage pulse in the magnetic pickup each time a spark plug should be fired. This pulse is transmitted through the pickup coil to the power switching transistor in the control unit and causes the transistor to interrupt the current flow through the primary circuit. This break in the primary circuit induces a high voltage in the secondary coil circuit and fires a spark plug.

The length of time that the switching transistor allows the flow of current in the primary circuit is determined by the electronic circuitry in the control unit.

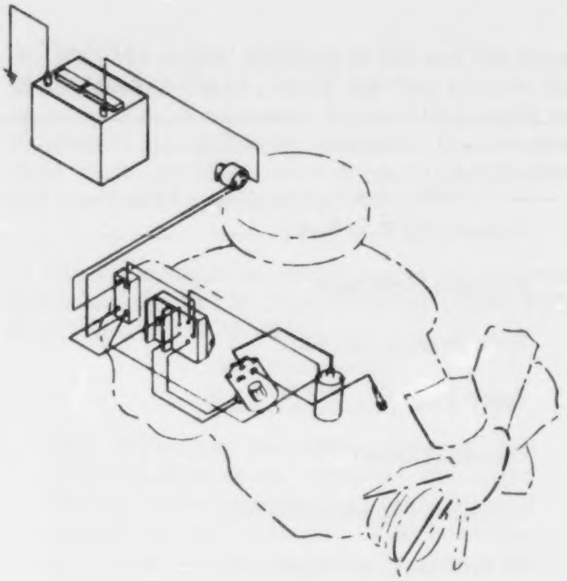


Figure 4-30. Electronic Ignition System

Note

THIS DETERMINES "DWELL." DWELL IS NOT ADJUSTABLE. THERE IS NO MEANS PROVIDED TO CHANGE IT BECAUSE CHANGES ARE NOT NECESSARY.

Note

THE READING OBTAINED WITH A DWELL METER HAS NO SIGNIFICANCE IN DIAGNOSING OR SERVICING THE IGNITION SYSTEM. SINCE DWELL AFFECTS IGNITION TIMING, PERIODIC CHECKS OF TIMING BECOME UNNECESSARY AFTER BASIC IGNITION TIMING IS SET.

Ignition maintenance is reduced to inspection of the distributor cap, rotor, wiring, and the cleaning and changing of spark plugs as needed.

4-51. ELECTRONIC IGNITION TEST. The electronic ignition system (Figure 4-31) may be tested using a voltmeter with a 20,000 ohm/volt rating and an ohmmeter which uses a 1-1/2 volt battery for its operation. Both meters should be in calibration. When ignition system problems are suspected, the following procedure should be followed:

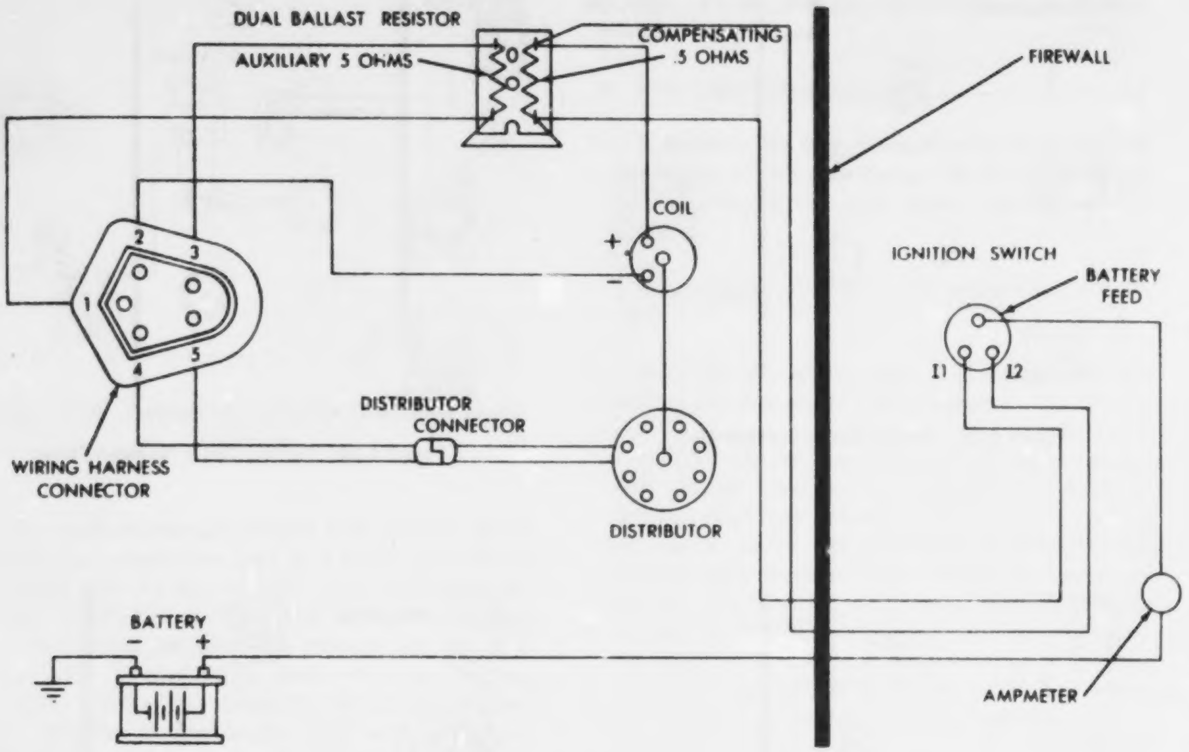

DUAL BALLAST RESISTOR
AUXILIARY 5 OHMS
COMPENSATING .5 OHMS
FIREWALL
COIL
+
−
IGNITION SWITCH
BATTERY FEED
I1
I2
1
2
3
4
5
DISTRIBUTOR CONNECTOR
WIRING HARNESS CONNECTOR
DISTRIBUTOR
BATTERY
−
+
AMPMETER

Figure 4-31. Electronic Ignition System (Wiring Schematic)

a. Visually inspect all secondary cables at the coil, distributor and spark plugs for cracks and tightness.

b. To check wiring harness and connections:

1. Check primary wire at the ignition coil and ballast resistor for tightness. If the above checks do not determine the problem, the following steps will determine if a component is faulty.

2. Check and note battery voltage reading using voltmeter. Battery voltage should be at least 12 volts.

3. Remove the multi-wiring connector from the control unit.

CAUTION

Whenever removing or installing the wiring harness connector to the control unit, the ignition switch must be in the "Off" position.

4. Turn the ignition switch "On."

5. Connect the negative lead of a voltmeter to a good ground.

6. Connect the positive lead of the voltmeter to the wiring harness connector cavity number 1. Available voltage at cavity number 1 (Figure 4-32) should be within 1 volt of battery voltage with all accessories off. If there is more than a 1 volt difference, figure 4-32 shows the circuit that must be checked.

7. Connect the positive lead of the voltmeter to the wiring harness connector cavity number 2. Available voltage at cavity number 2 (Figure 4-33) should be within 1 volt of battery voltage with all accessories off. If there is more than a 1 volt difference, figure 4-33 shows the circuit that must be checked.

8. Connect the positive lead of the voltmeter to the wiring harness connector cavity number 3. Available voltage at cavity number 3 (Figure

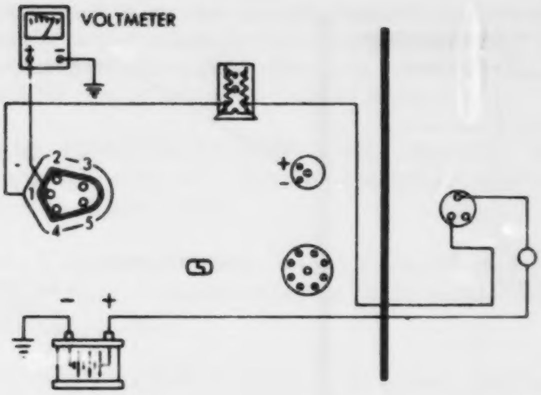


Figure 4-32. Testing Cavity Number One

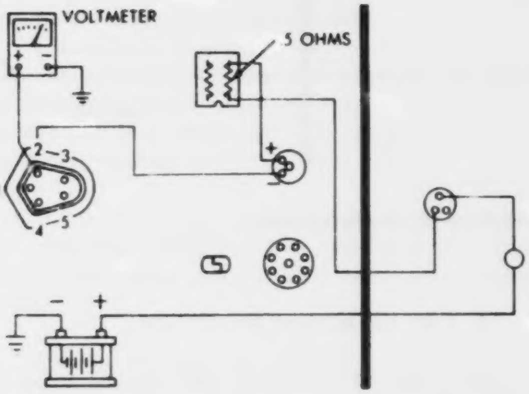


Figure 4-33. Testing Cavity Number Two

4-34) should be within 1 volt of battery voltage with all accessories off. If there is more than a 1 volt difference, figure 4-34 shows the circuit that must be checked.

9. Turn ignition switch "Off."

c. To check distributor pickup coil:

1. Connect an ohmmeter to wiring harness connector cavity number 4 and number 5. (Figure 4-35). The ohmmeter resistance should be between 150 and 900 ohms.

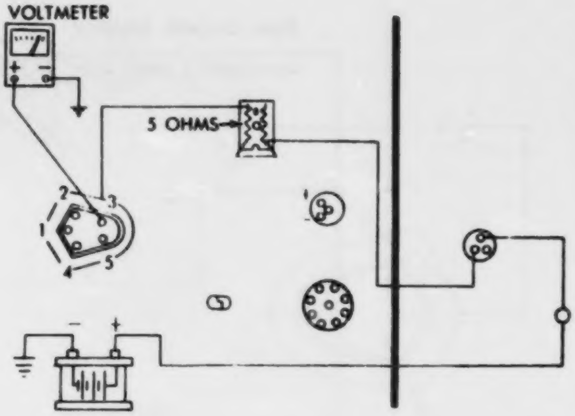


Figure 4-34. Testing Cavity Number Three

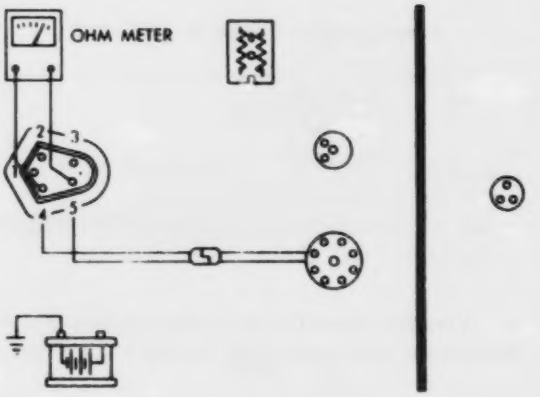


Figure 4-35. Testing Pick Up Coil at Wiring Harness Connector, Cavities Four and Five

If the readings are higher or lower than specified, disconnect the dual lead connector coming from the distributor (Figure 4-36). Using the ohmmeter, check the resistance at the dual lead connector. If the reading is not between the prementioned resistance values, replace the pickup coil assembly in the distributor.

2. Connect one ohmmeter lead to a good ground and the other lead to either connector of the distributor (Figure 4-36). Ohmmeter should show an open circuit. If the ohmmeter does show a reading, the pick up coil in the distributor must be replaced.

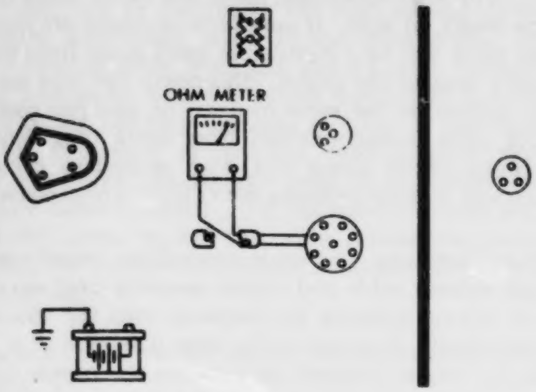


Figure 4-36. Testing Pick Up Coil at Distributor Lead Connector

d. To check electronic control unit ground circuit connect one ohmmeter lead to a good ground and the other lead to the control unit connector pin number 5 (Figure 4-37). The ohmmeter should show continuity between the ground and the connector pin. If continuity does not exist, tighten the bolts holding the control unit to the engine. Then recheck. If continuity does still not exist, control unit must be replaced.

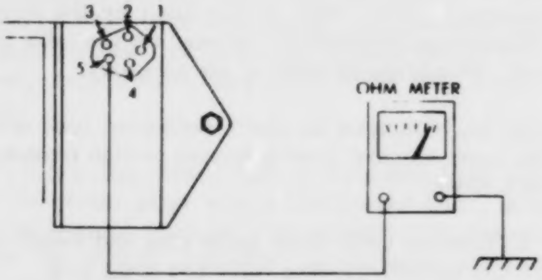


Figure 4-37. Testing Ground Circuit

e. Reconnect wiring harness at control unit and distributor.

Note

Whenever removing or installing the wiring harness connector to the control unit, the ignition switch must be in the "Off" position.

f. Check air gap between reluctor tooth and pick up coil. To set the gap, refer to paragraph 4-64, "Air Gap Adjustment."

g. Check ignition secondary.

1. Remove the high voltage cable from the center tower of the distributor. Hold the cable approximately 3/16 inch from engine. Crank engine.

2. If arcing does not occur, replace the control unit.

3. Crank the engine again. If arcing still does not occur, replace the ignition coil.

4. If a problem does not show up when making the voltage checks, coil resistance checks, or ground continuity checks it is likely the control or coil is faulty. It is unlikely that both units would fail simultaneously. However, before replacing the control unit make sure no foreign matter is lodged in or blocking the female terminal cavities in the harness connector. If clear, try replacing control unit or coil to see which one restores secondary ignition voltage.

4-52. SECONDARY CIRCUIT INSPECTION. Check the coil for secure mounting. Wipe the coil with a damp cloth moistened in Stoddard type solvent and check for cracks in the coil case. Check coil terminals for tight connections and proper polarity. See Table 4-7 for troubleshooting guide.

4-53. DISTRIBUTOR CAP. Remove wires from towers in cap, one at a time, and inspect for cracks, corrosion, burning, or flashover. If any of these conditions are present, the distributor cap should be replaced.

When installing wires into the towers make sure terminals are fully seated in tower and rubber boots are fully seated around towers. Replace any boot that does not make a good seal.

Remove distributor cap and inspect the inside for flashover, cracking of carbon button, cracking of cap, and burned, worn or grooved terminals. If any of these conditions are present the distributor cap should be replaced.

Light scaling of the terminals, caused by arcing of the spark from the rotor can be cleaned with a sharp knife. If heavy scaling of the terminals is present, the distributor cap should be replaced.

A cap that is greasy or dirty or has a powdered like substance on the inside should be cleaned with a solution of warm water and a mild detergent. Scrub with a soft brush, thoroughly rinse, and dry with a clean soft cloth.

4-54. ROTOR. Inspect the rotor for cracks, excessive burning of the tip, and proper tension of the spring terminal. If any of these conditions are present, the rotor should be replaced.

Light scaling of the tip can be cleaned with a sharp knife, however, if heavy scaling is present, the rotor should be replaced.

The rotor can be cleaned with a solution of warm water and a mild detergent. Dry thoroughly before placing back into service.

4-55. SPARK PLUG WIRES. Check the high tension cable connections for good contact at the coil and distributor cap towers and at the spark plugs. Terminals should be fully seated. The nipples and spark plug covers should be in good condition. Nipples should fit tightly on the coil cap towers and spark plug cover should fit tight around spark plug insulators. Cable connections that are loose will corrode and increase the resistance and permit water to enter the towers causing ignition malfunction. To maintain proper sealing between the towers and nipples, cable and nipple assemblies should not be removed from the distributor or coil towers unless nipples are damaged or cable testing indicates high resistance or broken insulation.

Clean high tension cables with a cloth moistened with a non-flammable solvent and wipe dry. Check for brittle or cracked insulation.

When testing secondary cables for punctures and cracks with an oscilloscope follow the instructions of the equipment manufacturers.

If an oscilloscope is not available, secondary cables can be tested as follows:

a. Engine not running, connect one end of a test probe to a good ground, other end free for probing.

b. Disconnect cable at spark plug end. Insulate cable end from grounding.

c. With engine running, move test probe along entire length of wire. If punctures or cracks are present there will be a noticeable spark jump from the faulty area to the probe. Secondary coil wire may be checked in the same manner, be sure one spark plug cable is disconnected from spark plug while running probe along coil wire secondary cable. Cracked, leaking or faulty cables should be replaced.

When installing new cable assemblies, install new high tension cable and nipple assembly over cap or coil tower, entering the terminal into the tower, push lightly, then pinch the large diameter of nipple to release trapped air between the nipple and tower. Continue pushing on the cable and nipple until cables are properly seated in the cap towers. Use the same procedure to install cable in coil tower. Wipe the spark plug insulator clean before reinstalling cable and cover.

Use the following procedure when removing the high tension cable from the spark plug. First, remove the cable from the retaining bracket. Then grasp the terminal as close as possible to the spark plug, rotate slightly and use a straight and steady pull. Do not use pliers and do not pull the cable at an angle. Doing so will damage the insulation, cable terminal or the spark plug insulator. Wipe spark plug insulator clean before reinstalling cable and cover.

Resistance type cable is identified by the words "Electronic Suppression" printed on the cable jacket. No additional resistors are necessary.

Use an ohmmeter to check resistance type cable for open circuits, loose terminals or high resistance as follows:

a. Remove cable from spark plug and install the proper adapter between cable and spark plug.

b. Lift distributor cap from distributor with cables intact. Do not remove cables from cap.

c. Connect the ohmmeter between spark plug adapter and the corresponding electrode inside the cap, making sure ohmmeter probes are in good contact. If resistance is more than 30,000 ohms, remove cable at cap tower and check the cable resistance. If resistance is more than 30,000 ohms on cables under twenty-five inches long or 50,000 ohms on cables over twenty-five inches long, replace cable assembly. Test all spark plug cables in same manner.

To test coil to distributor cap high tension cable, remove distributor cap with the cable intact. Do not remove cable from the coil or cap. Connect the ohmmeter between center contact in the cap and either primary terminal at coil. If the combined resistance of coil and cable is more than 25,000 ohms, remove the cable at coil tower and check cable resistance. If resistance is more than 15,000 ohms, replace the cable. If resistance is less, check for a loose connection at the tower or for a faulty coil.

Inspect coil tower for cracks, carbon tracking or oil leaks.

4-56. SPARK PLUGS. Under normal conditions, these spark plugs will give long life performance with the normal maintenance listed in this manual. The spark plugs should be cleaned, tested and gapped at the recommended intervals.

a. Loosen the spark plugs one full turn, then blow any accumulation of dirt out of the spark plug wells before completing the removal.

b. Examine firing end of plug carefully and compare findings with table 4-4. Careful analysis of spark plug deposits can reveal a great deal about engine operating conditions.

c. Remove carbon and other deposits from the threads with a stiff wire brush. Any deposits will retard the heat-flow from the plug to the cylinder head, causing spark plug overheating and preignition.

d. Clean any heavy carbon deposits from the inside of the plugs with a thin-bladed knife, then finish cleaning them with an abrasive-type cleaner. Use the cleaner sparingly, as excessive abrasive blasting may damage the porcelain around the center electrode. If the porcelain is badly glazed or eroded, replace the spark plugs.

e. While plugs are removed, perform compression check, outlined in paragraph 4-71.

f. After cleaning, examine the plug carefully for cracked or broken insulator, badly eroded electrodes and other signs of failure. Replace as required.

g. Clean the electrode surfaces with a small file. Dress the electrodes to secure flat parallel surfaces on both the center and side electrode.

h. Adjust the spark plug gap to 0.035 inch, by bending only the outside electrode. Use a round wire-type gauge to check the gap. If old spark plugs are reused, install with new gaskets. Torque to 10 foot/pounds.

Note

> Do not overtighten spark plugs, the gap may change considerably due to distortion of the plug outer shell, or the insulator may be cracked.

4-57. IGNITION COIL. The ignition coil is designed to operate with an external ballast resistor. When testing the coil for output, include resistor in tests. Inspect the coil for external leaks and arcing.

Test coil according to coil tester Manufacturer's instructions. Test coil primary resistance. Test ballast resistor resistance. Test coil secondary resistance. Replace any coil or ballast resistor that does not meet specifications.

Every time an ignition coil is replaced because of a burned tower, carbon tracking, or any evidence of arcing at the tower, the nipple or boot on the coil end of the secondary cable, replace cable. Any arcing at the tower will carbonize the nipple so that placing it on a new coil will invariably cause another coil failure.

If secondary cable shows any signs of damage, cable should be replaced with a new cable with a neoprene nipple since the old cable can cause arcing, and therefore ruin a new coil.

4-58. IGNITION TIMING. To obtain maximum engine performance, the distributor must be correctly positioned on the engine to give proper ignition timing.

The ignition timing test will indicate timing of the spark at number one cylinder.

Test procedures are as follows:

a. Connect a suitable Power Timing Light to number one cylinder (refer to the equipment manufacturer's instructions for correct connecting procedures). Do not puncture cables, boots or nipples with test probes. Always use proper adapters. Puncturing the spark plug cables with a probe will damage the cables. The probe can separate the con-

TABLE 4-4. SPARK PLUG CONDITION ANALYSIS

APPEARANCE	PLUG CONDITION	CAUSE	SERVICE PROCEDURE	
			CLEAN & REGAP	REPLACE
Light tan or gray deposits on firing tip	Normal	Normal use and engine condition	X	
Black, dry fluffy carbon deposits on insulator tips, exposed shell surfaces and electrodes	Carbon fouled	Too cold a plug, weak ignition, dirty air cleaner, defective fuel pump, too rich a fuel mixture, improperly operating heat riser or excessive idling	X	
Wet, black deposits on the insulator, shell bore and electrodes	Oil fouled	Excessive oil entering combustion chamber through worn rings and pistons, excessive clearance between valve guides and stems, or worn or loose bearings	X	
Dark gray, black, yellow or tan deposits or a fused glazed coating on the insulator tip	Lead fouled	Highly leaded gasoline	X	
Deposits built up, closing gap between electrodes	Gap bridged	Excessive oil or carbon fouling	X	
Severely worn or eroded electrodes	Worn	Caused by severe service and not servicing plugs at proper intervals		X
Melted or spotty deposits resembling bubbles or blisters on electrode and insulator	Fused spot deposit	Sudden acceleration	X	
White or light gray insulator with small black or gray brown spots and with bluish-burnt appearance of electrodes	Overheating	Engine overheating Wrong type of fuel, loose spark plugs, too hot a plug, low fuel pump pressure or incorrect ignition timing	X	
Melted electrodes and possibly blistered insulator Metallic deposits on insulator indicate engine damage	Pre-ignition	Wrong type of fuel, incorrect ignition timing or advance. Too hot a plug, burnt valves or engine overheating.		X

ductor and cause high resistance. In addition breaking the rubber insulation may permit secondary current to arc to gound.

b. Start engine and run until operating temperature is obtained.

c. Set hot idle engine speed. (Refer to Table 4-5.)

d. Disconnect vacuum hose at distributor and plug vacuum hose.

e. Loosen distributor hold-down arm screw (Figure 4-38) just enough so the distributor housing can be rotated in its mounting.

f. Aim Power Timing Light at timing plate on chain case cover. If light flash occurs when timing mark on vibration damper is located before specified degree mark on timing plate in the direction of engine rotation, timing is advanced. To adjust, turn distributor housing in direction of rotor rotation.

If flash occurs when the vibration timing mark is located after specified degree mark in the direction of engine rotation, timing is retarded. To adjust, turn distributor housing against direction of rotor rotation. Refer to Table 4-5. (Moving the distributor housing against shaft rotation advances timing and with shaft rotation retards timing.)

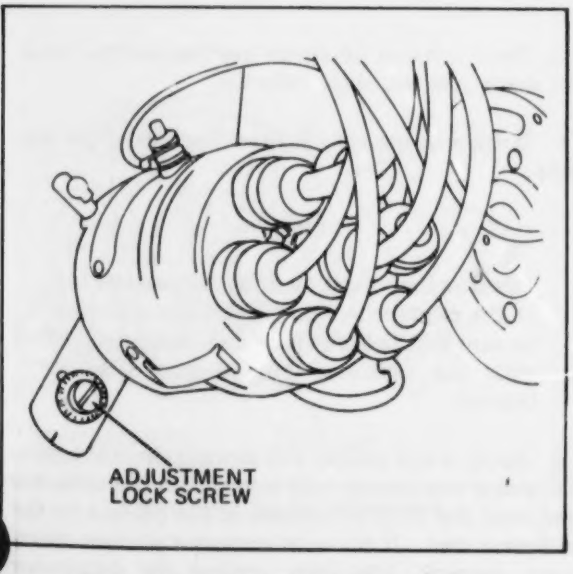


Figure 4-38. Timing Adjustment Lock Screw

CAUTION

Do not use distributor vacuum advance chamber as a turning handle when turning distributor.

g. Tighten distributor hold-down arm screw after timing has been set and recheck timing adjustment with a Power Timing Light.

h. When ignition timing is correct, reconnect vacuum hose to distributor.

i. If engine idle speed has changed, readjust curb idle. DO NOT RESET TIMING.

4-59. DISTRIBUTOR TESTS.

4-60. CENTRIFUGAL ADVANCE CURVE.

a. Remove distributor following procedure in paragraph 5-74.

TABLE 4-5. ENGINE TUNE-UP SPECIFICATIONS

Minimum compression pressure	100 psi
Maximum variation between cylinders	25 psi
Firing order	1-5-3-6-2-4
Distributor rotation	Clockwise
Ignition timing	12° BTDC
No-load governed speed	2550 RPM
Engine idle speed (engine warm and transmission in drive)	500-525 RPM
Fast idle speed (engine cold, choke out and transmission in neutral)	1800 RPM
Fuel pump pressure	3½-5 psi
Engine idle manifold vacuum (In./Hg)	17
Tappet clearance (hot), intake	.012"
Tappet clearance (hot), exhaust	.024"
Spark plug gap	.035"
Centrifugal advance (distributor degrees at distributor RPM)	1.0° to 4.5° @550 4.5° to 7.9° @700 11.5° to 14.0° @2200
Vacuum advance (distributor degrees at inches of mercury)	1.5° to 11.0° @11" 5.0° to 8.0° @12.5"

b. Carefully mount distributor assembly (less cap and rotor) in a reliable stroboscope-type distributor tester.

Note

> It is important that the appropriate adapter for checking electronic type distributors is connected to the distributor stand and that the instructions for its usage are followed.

c. Turn the selector switch to the 6-cylinder position and motor switch to the correct direction of rotation. Refer to Table 4-5 for proper rotation.

d. Regulate tester speed control to operate distributor at 200 distributor rpm.

e. Align the "O" of distributor tester degree with any of the arrow flashes.

f. Adjust tester speed control to operate distributor at speeds called for in Table 4-5 and observe arrow flashes opposite tester degree ring to determine degrees of advance.

g. If advance is not according to specifications, replace with correct distributor shaft assembly (shaft, reluctor sleeve, governor weights as a complete assembly).

4-61. VACUUM DIAPHRAGM LEAK TEST.

a. With distributor mounted in distributor tester vacuum unit attached to distributor, proceed as follows:

b. Place thumb over end of vacuum pump and hose and adjust regulator control knob to give a reading of 20 inches with hose closed off to be sure tester hose does not leak.

c. Attach tester vacuum pump hose to the tube on the distributor vacuum unit. The vacuum gauge should hold on maximum vacuum obtainable if no leak exists.

d. Observe contact plate while performing leak test to test response of contact plate. There should be instant response to the pull of the diaphragm, moving the plate without a drag or bind.

e. If leakage is indicated, replace vacuum unit assembly.

4-62. VACUUM ADVANCE CURVE.

a. Connect tester vacuum pump hose to the distributor vacuum advance unit and perform operations c. through e. under "Centrifugal Advance Curve." Then proceed as follows:

b. Turn tester vacuum pump "ON." Adjust vacuum pump regulator to vacuum test specifications. See "Specifications" and observe arrow flashes on tester degree ring to determine degrees of advance.

c. If vacuum advance is above or below specifications, replace vacuum advance unit. Retest vacuum advance curve.

4-63. SHAFT AND BUSHING WEAR TEST.

a. Remove distributor (refer to "Distributor Removal").

b. Remove distributor rotor.

c. Clamp distributor in a vise equipped with soft jaws and apply only enough pressure to resist any movement of the distributor during the test.

d. Attach a dial indicator to distributor housing so indicator plunger arm rests against reluctor.

e. Place one end of a wire loop around the reluctor sleeve just above the reluctor.

f. Hook a spring scale in the other end of the wire loop.

Note

> The wire loop must be down against the top of the reluctor to insure a straight pull; also be sure that the wire loop does not interfere with the indicator or indicator holding bracket.

g. Apply a one pound pull toward the dial indicator and a one pound pull away from the indicator and read the total movement of the plunger on the indicator dial. If the total indicator plunger movement exceeds .006 inch, replace the distributor housing or shaft assembly, (refer to "Distributor Disassembly").

4-64. AIR GAP ADJUSTMENT. (Refer to figure 4-39.)

a. Align one reluctor tooth with pick up coil tooth.

b. Loosen pick up coil hold-down screw.

c. Insert .008 non-magnetic feeler gauge between reluctor tooth and pick up coil tooth.

c. Adjust air gap so that contact is made between reluctor tooth, feeler gauge, and pick up coil tooth.

e. Tighten hold-down screw.

f. Remove feeler gauge.

Note

No force should be required in removing feeler gauge.

g. Check air gap with .010 feeler gauge. A .010 feeler gauge should not fit into air gap.

CAUTION

A .010 feeler gauge can be forced into air gap. DO NOT FORCE FEELER GAUGE INTO AIR GAP.

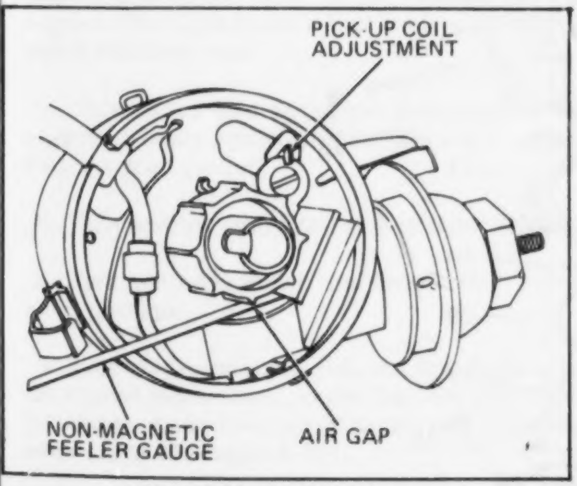


Figure 4-39. Air Gap Adjustment

h. Apply vacuum to vacuum unit and rotate governor shaft. Pickup pole should not hit reluctor teeth. Gap was not properly adjusted if hitting occurs. If hitting occurs on only one side of reluctor the distributor shaft is probably bent. Replace governor and shaft assembly.

4-65. CARBURETOR ADJUSTMENTS. A thorough road test and check of minor carburetor adjustments should preceed major carburetor service. Specifications for some adjustments are listed in Table 4-5.

Many performance complaints are directed at the carburetor. Some of these are a result of loose, misadjusted or malfunctioning engine or electrical components. Others develop when vacuum hoses become disconnected or are improperly routed. The proper approach to analyzing carburetor complaints should include a routine check of such areas.

a. Inspect all vacuum hoses for leaks.

b. Tighten intake manifold bolts and carburetor mounting bolts to specifications.

c. Perform cylinder compression test.

d. Clean or replace spark plugs as necessary.

e. Test resistance of spark plug cables. Refer to paragraph 4-55.

f. Inspect ignition primary wire and vacuum advance operation. Test coil output voltage, primary and secondary resistance. Replace parts as necessary. Refer to "Ignition System" and make necessary adjustment.

g. Reset ignition timing with vacuum advance line disconnected.

h. Set carburetor idle mixture adjustment (paragraph 4-69). Adjust throttle stop screw to specifications.

i. Test fuel pump for pressure and vacuum.

j. Inspect manifold heat control valve in exhaust manifold for proper operation.

k. Remove carburetor air filter element and blow out dirt gently with an air hose. Install a new filter element if necessary.

l. Inspect crankcase ventilation system.

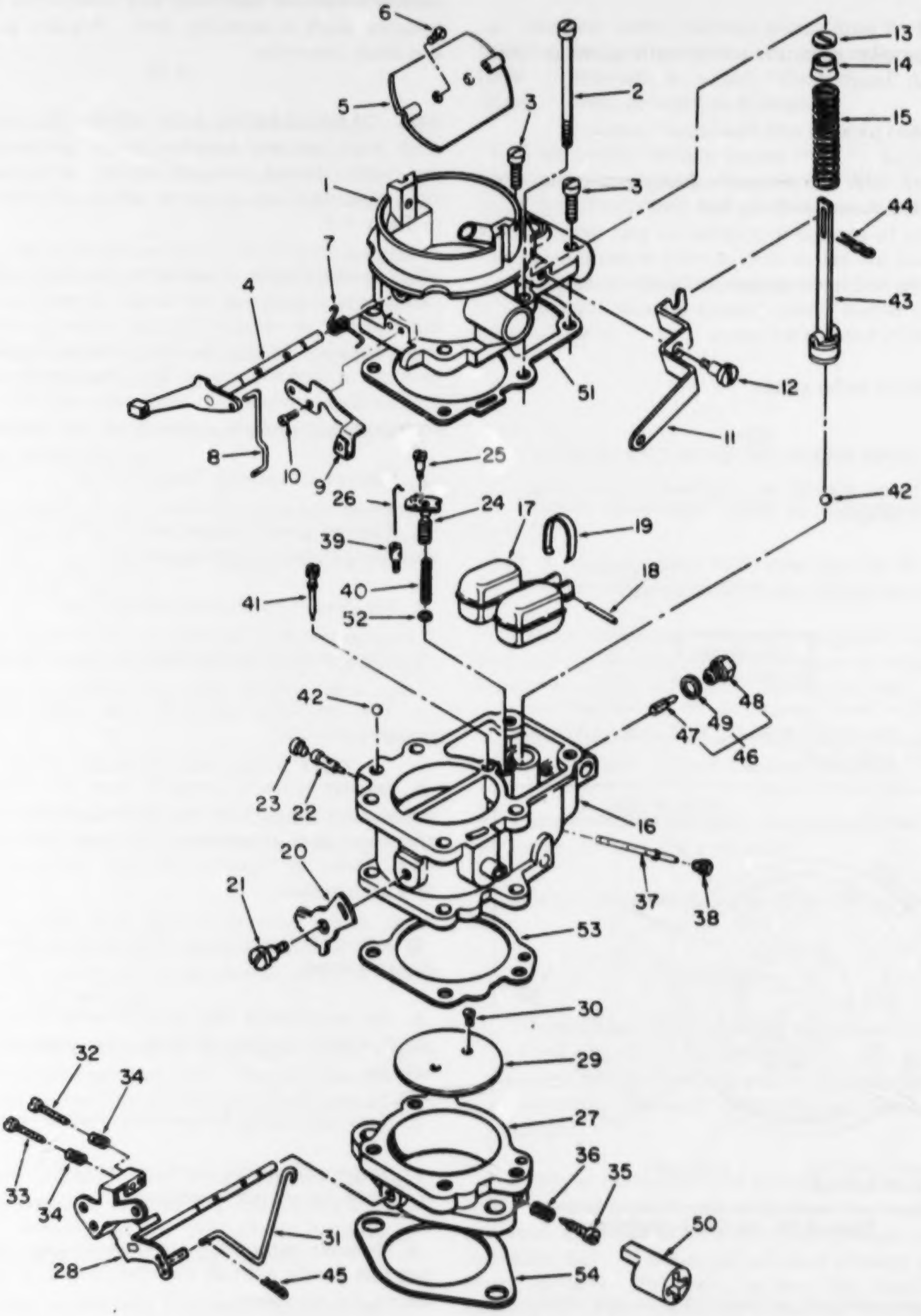

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Figure 4-40. Carburetor Assembly

m. Road test vehicle as a final test.

n. Refer to figure 4-40 for general details of the carburetor assembly.

4-66. IDLE RPM ADJUSTMENT. Engine idle rpm setting should be tested and recorded as it is when the vehicle is first brought into the shop for testing. This will assist in diagnosing complaints of engine stalling, creeping and hard shifting on vehicles equipped with automatic transmissions.

a. Connect red lead of the test tachometer unit to the negative primary terminal of the coil and the black lead to a good ground.

b. Turn selector switch to the 6-cylinder position.

c. Turn tachometer rpm switch to the 1000 rpm position.

d. With engine at normal operating temperature (off fast idle), momentarily open the throttle and release to make sure there is no bind in the linkage and that idle speed screw is against its stop.

e. Note engine rpm on 1000 rpm scale and adjust curb idle speed to specifications. See "Fuel System" specifications.

4-67. FAST IDLE RPM ADJUSTMENT (on the engine). This adjustment is best made while the engine is relatively cold.

a. Connect red lead of the test tachometer to the negative primary terminal of the coil and the black lead to a good ground.

b. Turn selector switch to the 6-cylinder position.

c. Turn the tachometer rpm switch to the high speed position.

d. Start the engine and pull out the choke until the scribed index mark on the fast idle cam (Item 20, Figure 4-40) lines up with the fast idle speed screw (Item 32, Figure 4-40).

e. Adjust fast idle speed screw until tachometer indicates 1800 rpm.

4-68. ACCELERATOR PUMP AND BOWL VENT ADJUSTMENT.

a. Adjust idle speed following procedure outlined in paragraph 4-65.

b. Open the choke valve so the throttle valve can be completely seated in the throttle bore. Be sure the pump connector rod (Item 31, Figure 4-40) is in the lower hole of the throttle lever (Item 28, Figure 4-40) and the pump plunger spring pin (Item 44, Figure 4-40) is in the lowest groove of the pump plunger (Item 43, Figure 4-40).

c. Measure distance between top of pump plunger bushing (Item 14, Figure 4-40) and bottom of pump plunger washer (Item 13, Figure 4-40). Distance should be 1/32 inch.

d. Bend the pump connector rod at lower bend, if necessary, to obtain this distance.

4-69. IDLE MIXTURE ADJUSTMENT. The carburetor idle mixture screw (Item 35, Figure 4-40) is equipped with a plastic limiter cap (Item 50, Figure 4-40) which should not be removed.

If the idle mixture can not be set within the limits of the cap, other problems exist and should be repaired before proceeding further.

a. Check ignition timing.

b. Adjust with engine running at normal operating temperature, choke "off," headlights turned on and air cleaner installed.

c. Turn idle speed screw (Item 33, Figure 4-40) for a speed of 550-600 rpm with transmission in neutral. Use a tachometer for this adjustment.

d. Turn limiter cap to obtain the highest rpm within the stops.

e. Readjust idle speed screw if necessary.

f. Turn limiter cap clockwise (lean) until speed drops 10-15 rpm then turn cap out 1/4 turn for final setting.

4-70. GOVERNOR SETTING.

It may be apparent after a long period of operation that the governor has become sluggish and is not as responsive as when it was originally installed. Such sluggishness is most generally caused by deposits of carbon and gum on the valve shaft and bearings, stabilizer piston, or cylinder. The remedy for this condition is to remove the governor and soak it in a cleaning solvent that will remove the carbon and gum deposits. It is always recommended that a governor that is not functioning properly be soaked in cleaning solvent before any adjustments or repairs are attempted, because in many cases, satisfactory performance can be restored in this manner. Before attempting any adjustment or recalibration of the governor, run the engine until normal operating temperature is reached. Manifold vacuum at sea level should be at least 16 inches with engine running at full throttle (governor operating), and at least 17 inches at idling speed, with an allowable reduction for altitude.

To adjust governor, refer to figure 4-41 and proceed as follows: Remove seal. For a HIGHER speed, turn adjusting cap counterclockwise or to the left; for LOWER speeds, turn adjusting cap clockwise or to the right. One turn of the adjusting screw will change the engine speed approximately 300 rpm.

4-71. ENGINE COMPRESSION CHECK.

Check compression in the following sequence:

a. Be sure that the engine is at normal operating temperature and that the battery is fully charged

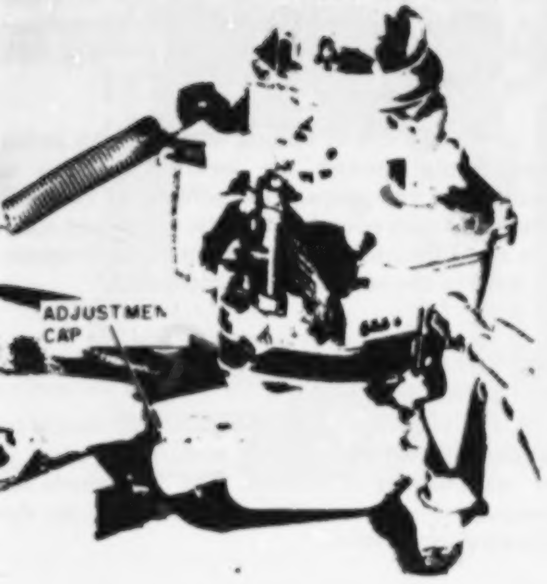


Figure 4-41. Governor Setting

efore checking engine compression.

b. Remove the spark plugs. Remove the coil high nsion lead at the distributor cap. Set the throttle ate and choke plate in the wide open position.

c. Install a compression gage in the No. 1 ylinder. Using a remote starter switch, crank the ngine several times and record the highest reading gistered. Note the number of compression rokes required to obtain the highest reading.

d. Repeat the test on each cylinder, cranking the ngine the same number of times for each cylinder s was required to obtain the highest reading on e No. 1 cylinder.

-72. INTERPRETATION OF COMPRESSION HECK. A variation of 20 psi from the specified ompression is satisfactory. However, the ompression of all cylinders should be uniform ithin 25 psi.

a. A reading of more than the allowable tolerance ove normal indicates excessive deposits in the ylinder.

b. A reading of more than the allowable lerance below normal indicates leakage at the cylinder head gasket, piston rings, or valves.

c. A low, even compression in two adjacent cylinders indicates a cylinder head gasket leak. This should be checked before condemning the rings or valves.

d. To determine whether the rings or the valves are at fault, squirt the equivalent of a tablespoon of heavy oil into the combustion chamber. Crank the engine to distribute the oil and repeat the compression test. The oil will temporarily seal leakage past the rings. If approximately the same reading is obtained, the rings are satisfactory, but the valves are leaking. If the compression has increased 10 psi or more over the original reading, there is leakage past the rings.

e. During a compression test if the pressure fails to climb steadily and remains the same during the first two successive strokes, or fails to climb during the entire test, a sticking valve is indicated.

4-73. CYLINDER HEAD FASTENERS TORQUE CHECK. Periodically the cylinder head fasteners must be checked to make certain they remain tightened to the proper torque.

a. Disconnect closed crankcase ventilation system hose at the vent valve in the rocker arm cover.

b. Remove all screws around the base of the rocker arm cover and remove the cover, and all traces of old gasket material from around cylinder head flange.

c. Cylinder head bolts will now be exposed as shown in figure 4-42. This figure shows the bolts

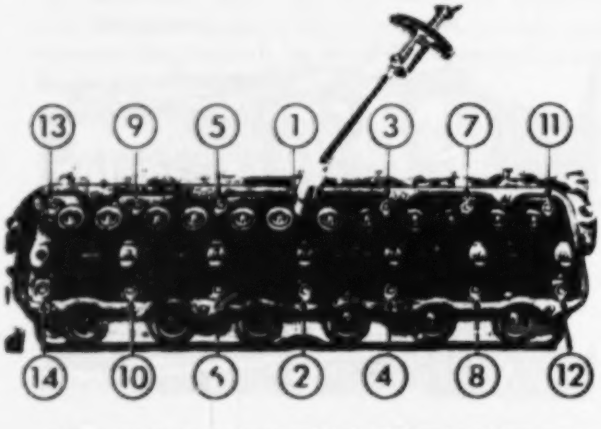


Figure 4-42. Cylinder Head Bolt Tightening Sequence

numbered in the sequence that must be followed in every tightening operation.

d. Starting at top center (bolt no. 1), tighten all head bolts to 50 foot-pounds. Proceed with the same operation through the remaining bolts, in numerical order.

e. Go back to the number 1 bolt and retighten to 65 foot-pounds. Repeat for all bolts, in numerical order.

f. Place a new rocker arm cover gasket in place and install rocker arm cover and retaining screws. Tighten screws to 40 inch-pounds torque.

g. Reconnect crankcase ventilation system hose at vent valve.

4-74. VALVE LASH ADJUSTMENT. Periodically check and adjust engine valve lash (tappet clearance) as outlined below:

a. Be sure the engine is at normal operating temperature before attempting to set the valve lash.

b. If the engine is cold, start and operate it for a minimum of 30 minutes at 1200 rpm to stabliize engine temperatures.

c. Remove the rocker arm cover.

d. With the engine idling, set the valve lash (figure 4-43), using a step-type feeler gage ("go" and "no go") preferable. (See Table 4-5.)

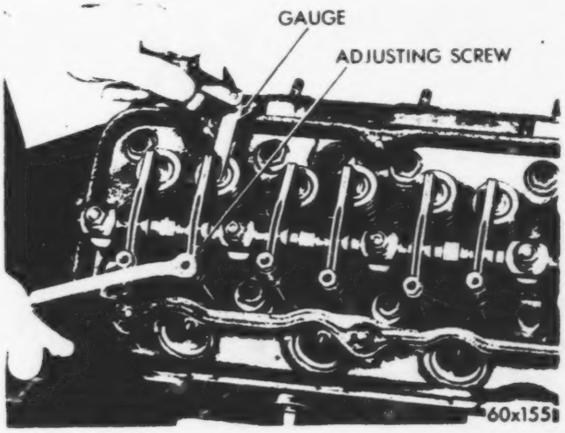


Figure 4-43. Adjusting Valve Lash

e. Examine the valve rocker arm cover gasket. If necessary to replace, clean the old gasket off the valve rocker arm cover. Coat one side of a new valve rocker arm cover gasket with oil resistant sealer. Lay the cemented side of the gasket in place in the cover.

f. Install the cover, making sure that the gasket seats evenly around the head. The cover is tightened in two steps. First torque the retaining bolts to 40 inch-pounds. Start the engine and allow it to run a minimum of two minutes, and retighten the bolts to the same torque specification.

4-75. TRANSMISSION BAND ADJUSTMENTS.

4-76. The transmission band adjustments should be checked at least annually, or whenever slippage in the transmission is evident. The procedures for these band adjustments are outlined in the following paragraphs.

4-77. KICKDOWN BAND ADJUSTMENT.

a. Locate kickdown band adjusting screw on left side of transmission case near the throttle lever shaft. (See figure 4-44.)

b. Loosen locknut and back off five full turns. Check adjusting screw to see that it turns freely in the case.

c. Tighten adjusting screw to 72 inch-pounds.

d. Back off adjusting screw 2 full turns. Hold adjusting screw in this position and tighten locknut to 35 foot-pounds.

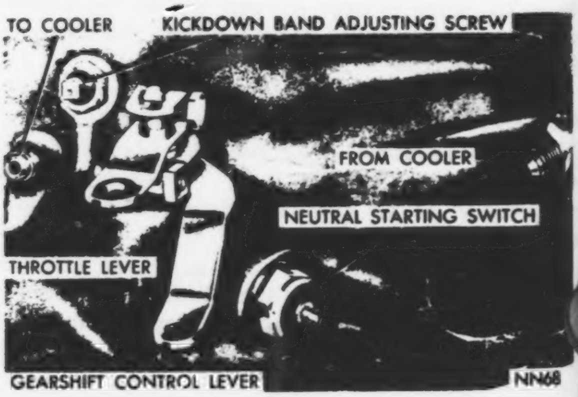


Figure 4-44. Kickdown Band Adjusting Screw

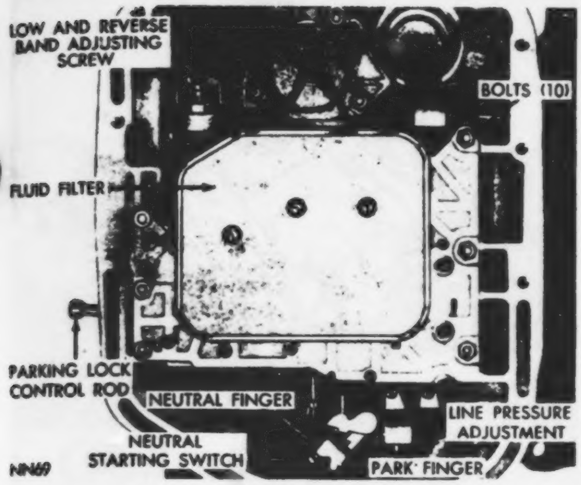


Figure 4-45. Low-Reverse Band Adjusting Screw

4-78. LOW-REVERSE BAND ADJUSTMENT.

a. Raise vehicle, drain transmission fluid and remove oil pan.

b. Loosen adjusting screw locknut (figure 4-45) and back off nut five full turns. Check adjusting screw to see that it turns freely in the lever.

c. Tighten band adjusting screw to 72 inch-pounds, then back it off exactly 2 full turns. Hold adjusting screw in this position and tighten locknut to 35 foot-pounds.

d. Reinstall oil pan, using a new gasket. Tighten pan bolts to 150 inch-pounds.

e. Refill transmission with the proper fluid and check fluid level after starting the engine and allowing sufficient time for warm-up.

f. Road test vehicle to check low-reverse band djustment.

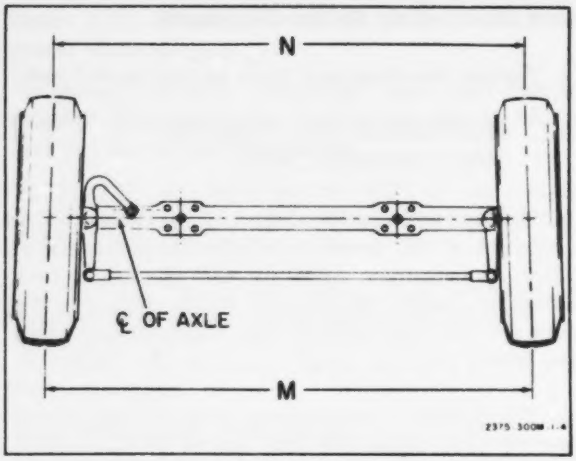


Figure 4-46. Toe-In Measurements

4-79. STEERING SYSTEM ADJUSTMENTS.

4-80. TOE-IN. Front wheel toe-in should be set at 1/8 inch. This dimension is achieved by lengthening or shortening the tie rod as required to set the leading edges of the front tires 1/8 inch closer together than the trailing edge. Proceed as follows to check and adjust:

a. Turn the front wheels to the exact straight-ahead position.

b. Check the toe-in of front wheels after rolling the truck ahead one full revolution of the wheels (with only the weight of the truck on the tires).

c. Actual toe-in measurements should be taken at hub-height, between the two points on the center of the tread at the rear of the tires ("M," figure 4-46).

d. Mark the point and roll the truck ahead so that the points are in the front at hub-height and measure the distance between the same two points on the tire treads ("N," figure 4-46).

e. The difference in the two measurements is the actual toe-in or toe-out.

f. To adjust the toe-in, turn the steering wheel so that the gear is in the mid-position.

g. Loosen the clamping bolts on the ends of the tie rod.

h. Turn the tie rod in the direction necessary to bring toe-in within the specified limits.

i. Tighten the clamping bolts on the tie rod ends.

4-81. STOP SCREW AND TURNING ANGLE ADJUSTMENT.

a. Turning angle is the degree of movement from a straight ahead position of the front wheels to either an extreme right or left position. Two factors of major importance when adjusting the angle are: tire interference with chassis and steering gear travel.

b. To avoid tire interference or bottoming of the steering gear, adjustable stop screws are located on the steering knuckles. (See figure 4-47.)

c. To adjust the turning angle, loosen the jam nuts and turn the steering knuckle stop screws in. Position support stands under the front axle so that the wheels are off the floor. Turn the wheels to extreme right, turn until the steering gear bottoms. Then back off the steering wheel 1/4 turn. Be sure to check both front tires for clearance. When the proper clearance is determined, back the left wheel stop screw out until it contacts the steering knuckle and tighten the locknut.

d. Repeat the same procedure on the left extreme turn also, and adjust the right steering knuckle stop screws.

4-82. STEERING GEAR ADJUSTMENTS.

4-83. A periodic inspection should be made to determine if excessive lash has developed within the steering gear due to wear or out-of-adjustment condition. Turn the steering wheel until front wheels are in the straight-ahead position. Secure the steering wheel in this position to prevent any further motion. Now shake one of the front wheels from side to side to enable any play in steering gear to be felt at the steering gear pitman arm ball. If play exists, adjustments should be made in the following sequence:

a. Adjust worm bearing preload.
b. Adjust rollershaft preload.

4-84. WORM PRELOAD CHECK AND ADJUSTMENT.

a. Disconnect linkage at pitman arm ball stud.

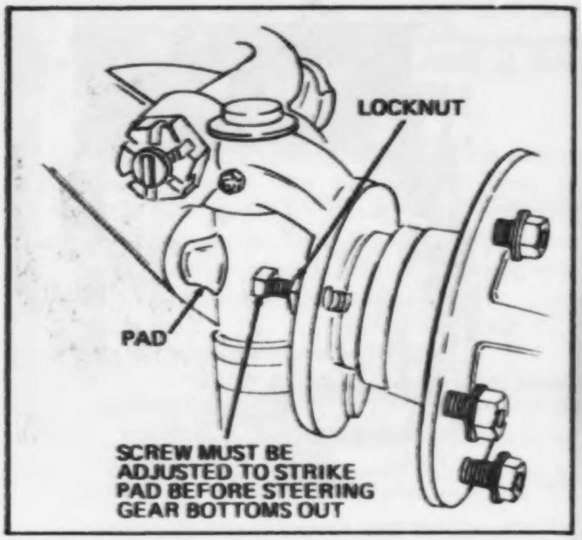

LOCKNUT
PAD
SCREW MUST BE ADJUSTED TO STRIKE PAD BEFORE STEERING GEAR BOTTOMS OUT

Figure 4-47. Steering Stop Screw

b. Turn steering wheel to end of travel in either direction, then back off 1/4 turn. Note the lash condition in this area.

c. Using a torque wrench or spring gage, turn steering wheel and note the torque required to move the steering wheel and keep it moving, which should be 1 to 6 inch-pounds.

d. Correcting this preload figure requires adding or removing shims from the worm cover. The shims are added to decrease preload, and removed to increase preload. Shims are available in three thicknesses, 0.010, 0.005, and 0.002. To remove or add shims, proceed as follows:

e. Drain all lubricant from steering gear.

f. Remove worm cover bolts as shown in figure 4-48, and remove worm cover.

g. Remove or add the proper thickness of shim for the adjustment to be made. Removal of a thicker shim results in a larger change in the preload reading.

h. Replace worm cover assembly and bolts. Tighten worm cover bolts to 18-22 foot-pounds and check preload. If necessary, repeat with a different selection of shims.

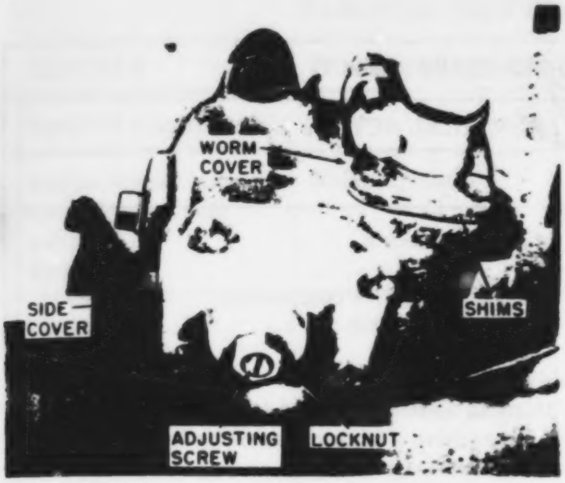


Figure 4-48. Steering Gear Adjustments

i. Adjust rollershaft preload as outlined in paragraph 4-85, and refill gear with lubricant.

4-85. ROLLERSHAFT PRELOAD CHECK AND ADJUSTMENT

a. Place steering gear in the exact center position of its travel. Drain old lubricant.

b. Rotate the steering wheel with a torque wrench or spring gage and note the torque required to maintain steering wheel motion through 180° travel. This torque should be 3 to 7 inch-pounds higher than the worm preload set in the previous paragraph.

c. If an adjustment is required, loosen the locknut on the side cover as shown in figure 4-48.

d. Turn the slotted adjusting screw clockwise to increase preload, and recheck. Turn the adjusting screw counterclockwise if a decrease in preload is required.

e. When preload setting is correct, hold adjusting screw with a screwdriver and tighten the locknut to 16 to 20 foot-pounds with an open end wrench.

f. Refill gear with new lubricant.

4-86. FRONT WHEEL BEARING ADJUSTMENT.

a. Front wheel bearings should be adjusted annually or whenever noticeable play develops due to bearing wear or looseness.

b. Install wheels, hubs, and bearings as shown in figure 4-11. Bearings should be packed with new grease at installation.

c. Install bearing adjusting nut, and while rotating wheel by hand, torque the nut to 15-20 foot-pounds to seat the bearing.

d. Back off the adjusting nut 60°, or one flat of nut. Tighten bearing locknut against adjusting nut to secure the adjustment.

e. If wheel now rotates freely, with no noise or evidence of side play, adjustment is satisfactory.

f. Install grease cap, after bending tang on locknut washer.

4-87. EXHAUST SYSTEM MAINTENANCE.

The exhaust system is equipped with a spark arresting muffler. Service the spark arrestor as follows:

a. Every 1200 hours or annually.

Note

SERVICE IN AN AREA WHERE THERE IS NO DANGER FROM FLYING SPARKS OF HOT CARBON PARTICLES.

1. Stop the engine and allow exhaust system to cool.
2. Remove cleanout plug located on the bottom of the muffler with a wrench. If a crust has formed over the hole, break it loose with a screwdriver or similar tool.
3. Start the engine and run it at high idle to blow collected particles out the cleanout hole. If particles are slow to discharge, momentarily cover the end of the tailpipe.
4. When discharge of particles stops, stop the engine and replace the cleanout plug securely.

b. Every 300 hours check the following:

1. Exhaust pipe to manifold nuts for security.
2. Clamps and hanger for security and deterioration.
3. Exhaust pipe and muffler for deterioration.

4-88. TROUBLES AND REMEDIES.

4-89. GENERAL. The troubles and remedies chart (table 4-6) summarizes troubles that may be encountered during operation of the vehicle. Many of the troubles can be remedied by the operator; however, major repairs and disassembly of major components must be undertaken only by a facility equipped to perform major overhaul operations.

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 1)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
ENGINE		
Engine will not crank	Batteries discharged	Charge batteries.
	Starter switch inoperative	Replace defective component.
	Starter inoperative	Replace starter.
	Starter drive locked	Loosen starter bolts and free pinion. Replace starter drive if pinion cannot be freed.
	Engine seized	Replace engine.
Engine cranks normally, but will not start	Improper starting procedure	See Section III, Operating instructions.
	No fuel in tank	Fill fuel tank.
	Ignition system not operating properly	Pull a spark plug wire off a plug and hold it 3/16 inch away from the block while operating the starter. If a spark jumps the gap, check the plugs. If not, check the following:
	(1) Defective secondary circuit	(1) Pull coil wire from the top of the distributor and hold it 3/16 inch from the cylinder head with the ignition on and the engine turning over. If the spark is good, check the ignition timing.
	(2) Engine out of time	(2) Check timing and adjust if necessary.
	(3) Distributor cap, rotor, or spark plug leads defective	(3) Replace defective parts.
	(4) Defective primary circuit	(4) If no spark or weak spark occurs when coil wire is checked, replace the coil, breaker points, resistor, condenser or primary circuit wiring as necessary to restore spark.
	Fuel system not operating properly	Check the following:
	(1) Fuel not reaching the carburetor	(1) Refer to Fuel System in this chart.
	(2) Carburetor not functioning properly	(2) Check for binding choke and repair if necessary. Check accelerating pump and fuel inlet system and clean and repair as necessary.

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 2)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
ENGINE (Continued)		
Engine cranks normally, but will not start (continued)	Valve timing off	Check condition of timing chain and sprockets and position of timing marks. Repair or replace chain and sprockets and realign timing marks.
Engine starts, but fails to keep running	Fuel system defective	Check the following:
	(1) Idle fuel mixture not properly adjusted	(1) Adjust mixture.
	(2) Engine idle speed set too low	(2) Speed up engine idle to specifications.
	(3) Choke not operating properly	(3) Free choke if binding and adjust to open fully when dash knob is pushed in.
	(4) Float setting incorrect	(4) Adjust float setting.
	(5) Fuel not reaching the carburetor	(5) Refer to Fuel System in this chart.
	Ignition system defective	Check the following:
	(1) Spark plugs defective	(1) Clean and adjust spark gap or replace spark plugs.
	(2) Open circuit in ignition resistor	(2) Replace resistor.
	(3) Defective high-tension lead	(3) Replace high-tension lead.
Engine runs but misses steadily at all speeds	One or more cylinders not delivering power	Check spark at the cylinder or cylinders. If spark is weak or not evident, repair or replace the spark plug lead or distributor cap. If a good spark occurs, check the spark plug and replace, if defective. If plug is good, a mechanical component is at fault and must be repaired as necessary to stop miss.
Engine runs, but misses erratically at all speeds, has poor acceleration, does not develop full power or has poor high speed performance	Malfunction of engine component or components	Check the following:
	(1) Ignition system defective	(1) Check the following components and repair or replace as necessary.

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 3)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
ENGINE (Continued)		
Engine runs, but misses erratically at all speeds, has poor acceleration, does not develop full power or has poor high speed performance (continued)	(1) Ignition system defective (continued)	(1) Check the following components and repair or replace as necessary. (continued) (a) Spark plugs (b) Ignition timing (c) Ignition coil (d) Distributor rotor (e) Primary and secondary wires and high tension leakage across coil, rotor, or distributor cap (f) Distributor advance mechanism (g) Distributor shaft for excessive play
	(2) Fuel system defective	(2) Check the following carburetor components and repair or replace as necessary: (a) Choke for binding (b) Float setting (c) Idle fuel mixture needles (idle miss or rough idle) (d) Power valve (high speed miss) (e) Clogged or undersize main and secondary jets (f) Fuel inlet system clogged or dirty (g) Accelerating pump parts defective or not properly adjusted (h) Air leaks between carburetor and manifold and/or fittings
	(3) Mechanical component defective	(3) Test compression and repair cylinder head gasket, piston rings, or valves as the test indicates.
	(4) Valve lash out of adjustment	(4) Adjust valve lash.
	(5) Excessive exhaust back pressure	(5) Free obstructions in exhaust system or replace parts necessary to relieve back pressure.
	(6) Cooling system leak	(6) Repair leak.

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 4)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
FUEL SYSTEM		
Fuel does not reach carburetor	No fuel	Fill tank.
	Clogged fuel filter	Replace filter.
	Clogged fuel line	Clean or replace as required.
	Air leak in fuel line	Replace defective section.
	Low fuel pump pressure, or no fuel pump pressure	Replace fuel pump.
Excessive fuel consumption	Leaking tank or lines	Replace defective parts.
	Carburetor idle setting too high	Adjust to correct idle setting.
Fuel gauge readings are incorrect	Poor electrical connections	Clean and tighten all connections.
	Fuel level transmitter defective	Replace fuel level transmitter.
	Fuel gauge defective	Replace fuel gauge.
EXHAUST SYSTEM		
Exhaust gas leakage	Loose pipe connections	Tighten.
	Deteriorated exhaust piping or muffler	Replace parts as required.
Excessive noise	Deteriorated muffler and/or exhaust piping	Replace parts as required.
BRAKES		
Brake pedal travels to floor-board without noticeable brake action	Fluid level low in master cylinder reservoir	Refill master cylinder reservoir and check entire brake system for fluid leaks. Repair if necessary. Bleed brakes.
Spongy brake pedal action	Air in hydraulic lines	Repair system to prevent air entering lines. Bleed brake system.
	Fluid level in master cylinder reservoir low	Refill master cylinder reservoir and check entire brake system for fluid leaks. Repair if necessary. Bleed brakes.
	Incorrect brake adjustment	Adjust or reline.

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 5)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
BRAKES (Continued)		
Spongy brake pedal action (continued)	Master cylinder piston cup leaking	Repair or replace master cylinder. Bleed brake system.
	Wheel cylinder or cylinders leaking	Repair or replace defective wheel cylinders. Bleed brake system..
Excessive pedal travel	Normal break wear	Adjust or reline brakes as necessary.
Uneven, noisy, grabbing, or hard brakes	Excessive dust or dirt in brake lining rivet holes or in brake drum	Clean dirt with scraper or air hose.
	Drums out of round	Turn drums to restore roundness or replace drums.
	Frozen master cylinder or wheel cylinder pistons	Replace defective cylinder.
	Improper brake shoe adjustment	Adjust shoes correctly.
	Warped or misaligned shoes	Replace shoes.
	Glazed linings	Remove glaze with medium grade sandpaper, Federal Specification P-P-101.
	Greasy linings	Replace linings and check for source of grease:
Brakes do not release	Improperly adjusted brake pedal	Adjust pedal free-travel to 3/16 to 3/8 inch.
	Restricted bypass port in master cylinder	Replace master cylinder.
	Swollen master cylinder piston cups	Rebuild master cylinder.
	Wheel cylinders sticking due to dirty or contaminated brake fluid	Clean the entire hydraulic system with denatured alcohol, Specification MIL-A-6091, and refill system with new brake fluid. Bleed brake system.
Hand brake inoperative	Improperly adjusted cable linkage	Adjust.
	Brake shoe worn	Adjust or replace brake linings as required.

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 6)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
BRAKES (Continued)		
Hand brake inoperative (continued)	Broken levers or cables	Replace levers or cables as required.
STEERING		
Jerky steering	Binding spindle bolt bushing	Lubricate.
	Loose, worn or damaged steering linkage or connections	Tighten or replace as necessary.
	Incorrect front wheel bearing adjustment	Adjust.
Loose steering	Loose, worn or damaged steering linkage or connections	Tighten or replace as necessary.
	Steering gear worn or out of adjustment	Repair or adjust as necessary.
	Incorrect front wheel bearing adjustment	Adjust.
Hard steering	Incorrect tire pressure	Check tire pressure.
	Lack of lubrication	Lubricate.
	Binding spindle bolt bearings	Lubricate or replace.
	Incorrect front wheel alignment	Align.
Vehicle pulls to one side	Incorrect tire pressure	Check tire pressure.
	Rear spring tie bolt off center	Position correctly.
	Bent spindle or spindle arm	Replace.
	Incorrect front wheel bearing adjustment	Adjust.

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 7)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
STEERING (Continued)		
Vehicle pulls to one side (continued)	Incorrect front wheel alignment	Align.
COOLING		
Engine overheats	Water pump and fan belt tension incorrect	Adjust belts.
	Radiator air flow obstructed	Remove obstruction.
	Thermostat stuck or otherwise defective	Replace thermostat.
	Cooling system passages obstructed by rust, scale, or other foreign matter	Reverse flush or clean as necessary.
	Water pump inoperative	Repair or replace pump.
Engine fails to reach normal operating temperature	Thermostat stuck open, or incorrect heat range	Replace thermostat.
	Temperature transmitting unit defective (causing gauge to indicate low engine temperature)	Check coolant temperature with thermometer. Replace transmitting unit if necessary.
	Temperature gauge unit defective (not indicating true engine temperature)	Check coolant temperature with thermometer. Replace gauge unit if necessary.
Loss of coolant	Leaking radiator	Repair or replace.
	Loose or damaged hose connections	Tighten or replace hoses.
	Water pump leaking	Repair or replace.
	Cylinder head gasket defective	Replace gasket.
	Cylinder block core plugs leaking	Replace plugs.
	Cracked cylinder head block	Replace.

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 8)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
COOLING (Continued)		
Loss of coolant (continued)	Radiator pressure cap defective or incorrect type	Replace with correct cap.
ELECTRICAL		
Battery low in charge; headlights dim at idle speed	Loose, slipping or broken alternator drive belt	Check belt. Adjust or replace as required.
	Defective wiring or loose connection	Inspect wiring. Repair or replace as necessary. Check connections. Tighten as required. Clean battery terminals and tighten.
	Defective battery	Check battery voltage with resistance type tester. Adjust resistance until ammeter reads three times amper-hour rating of battery. Hold for 15 seconds and note voltage. If voltage is below 9.6 volts, check the specific gravity of each cell. If there is more than 50 points (0.050) between cells, replace battery.
Battery will not hold charge. Alternator has low or no output	Loose, slipping or broken alternator drive belt	Check the belt. Adjust or replace as required.
	Defective wiring or loose connection	Check wiring. Repair or replace as required. Check connections. Tighten as necessary. Clean and tighten battery terminals.
	Defective battery	Check battery as described under ELECTRICAL "Defective battery," above. Replace battery if defective.
	Defective alternator or regulator	Perform alternator output test as described in paragraph 4-46. Repair or replace as required.
Lights and fuses fail prematurely. Short battery life. Battery uses excessive amount of water. High charging rate.	Defective regulator	Replace regulator.
TRANSMISSION		
Harsh initial engagement in N to D or N to R	Low transmission fluid level	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Engine idle speed too high	Correct idle speed adjustment (paragraph 4-66).

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 9)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
TRANSMISSION (Continued)		
Harsh initial engagement in N to D or N to R (Continued)	Hydraulic Control pressures out of adjustment	Adjust control pressures (see section V).
	Low and reverse bands out of adjustment	Perform band adjustment (paragraph 4-75).
	Low and reverse servo or accumulator malfunction	Check and repair (See section V).
Delayed initial engagement in N to D	Low transmission fluid level	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Control cable to shift levers out of adjustment	Adjust control cable.
	Hydraulic control pressures out of adjustment	Check and adjust (See section V).
	Control valves sticking in body	Disassemble and repair control valve assembly (See section V).
	Accumulator failure	Disassemble, clean and repair (See Section V).
	Clutch failure	Disassemble, clean and repair (See Section V).
Runaway (Engine overspeeding) on 2-3 and 3-2 shifts	Low transmission fluid level	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Gearshift control cable out of adjustment	Adjust cable for proper position of shift levers (See Section V).
	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Kickdown band out of adjustment	Adjust kickdown band (paragraph 4-77).
	Governor stuck or malfunctioning	Disassemble and repair governor (See Section V).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Kickdown servo failure	Disassemble, clean and repair (See Section V).
	Accumulator failure	Disassemble, clean and repair (See section V).
	Clutch failure	Disassemble, clean and repair (See Section V).

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 10)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
TRANSMISSION (Continued)		
Harsh 2-3 and 3-2 shifts	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Kickdown band out of adjustment	Adjust kickdown band (paragraph 4-77).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Kickdown servo failure	Disassemble, clean and repair (See Section V).
	Accumulator failure	Disassemble, clean and repair (See Section V).
	Clutch failure	Disassemble, clean and repair (See Section V).
No upshift	Low transmission fluid level	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Gearshift control cable out of adjustment	Adjust cable for proper position of shift levers (See Section V).
	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Kickdown band out of adjustment	Adjust kickdown band (paragraph 4-77).
	Governor stuck or malfunctioning	Disassemble and repair governor (See Section V).
	Oil strainer clogged	Clean oil strainer, refill with clean fluid (Paragraph 4-19).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Kickdown servo failure	Disassemble, clean and repair (See Section V).
	Accumulator failure	Disassemble, clean and repair (See Section V).
	Clutch failure	Disassemble, clean and repair (See Section V).
No kickdown or normal downshifting	Low transmission fluid level	Add fluid to bring level to full mark on dipstick (paragraph 4-19).

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 11)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
TRANSMISSION (Continued)		
No kickdown or normal downshifting (continued)	Gearshift control cable out of adjustment	Adjust cable for proper position of shift levers (See Section V).
	Engine idle speed too high	Adjust engine idle speed to 500/550 RPM (paragraph 4-66).
	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Kickdown band out of adjustment	Adjust kickdown band (paragraph 4-77).
	Governor stuck or malfunctioning	Disassemble and repair governor (See Section V).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Kickdown servo failure	Disassemble, clean and repair (See Section V).
	Accumulator failure	Disassemble, clean and repair (See Section V).
Erratic shifting	Low transmission fluid	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Gearshift control cable out of adjustment	Adjust cable for proper position of shift levers (See Section V).
	Engine idle speed too high	Adjust engine idle speed to 500/550 RPM (paragraph 4-66).
	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Kickdown band out of adjustment	Adjust kickdown band (paragraph 4-77).
	Governor stuck or malfunctioning	Disassemble and repair governor (See Section V).
	Oil strainer clogged	Clean oil strainer, refill with clean fluid (paragraph 4-19).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Front pump malfunction	Disassemble and repair; or replace front pump (See Section V).

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 12)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
TRANSMISSION (Continued)		
Slips in forward gears only	Low transmission fluid level	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Gearshift control cable out of adjustment	Adjust cable for proper position of shift levers (See Section V).
	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Kickdown servo failure	Disassemble, clean and repair (See Section V).
	Accumulator failure	Disassemble, clean and repair (See Section V).
	Front oil pump failure	Disassemble and repair pump (See Section V).
	Clutch failure	Disassemble, clean and repair (See Section V).
Slips in reverse only	Low transmission fluid	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Gearshift control cable out of adjustment	Adjust cable for proper position of shift levers (See Section V).
	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Low and reverse band out of adjustment	Adjust low and reverse band (paragraph 4-78).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Low and reverse servo failure	Disassemble, clean and repair (See Section V).
	Front pump or clutch failure	Disassemble, clean and repair (See Section V).
Slips in all gears	Low transmission fluid	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 13)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
TRANSMISSION (Continued)		
Slips in all gears (Continued)	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Front oil pump or seal ring failure	Disassemble and repair or replace defective parts (See Section V).
No drive in any position	Low transmission fluid	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Oil strainer clogged	Clean oil strainer, refill with clean fluid (paragraph 4-19).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Converter drive plate or front oil pump failure	Disassemble and repair or replace defective parts (See Section V).
No drive in forward gears only	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Kickdown band out of adjustment	Adjust kickdown band (paragraph 4-77).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Kickdown servo failure	Disassemble, clean and repair (See Section V).
	Accumulator failure	Disassemble, clean and repair (See Section V).
	Clutch failure	Disassemble, clean and repair (See Section V).
No drive in reverse gear only	Hydraulic control pressures out of adjustment	Check and adjust (See Section V).
	Low and reverse band out of adjustment	Adjust low and reverse band (paragraph 4-78).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Low and reverse servo failure	Disassemble, clean and repair (See Section V).
	Clutch failure	Disassemble, clean and repair (See Section V).

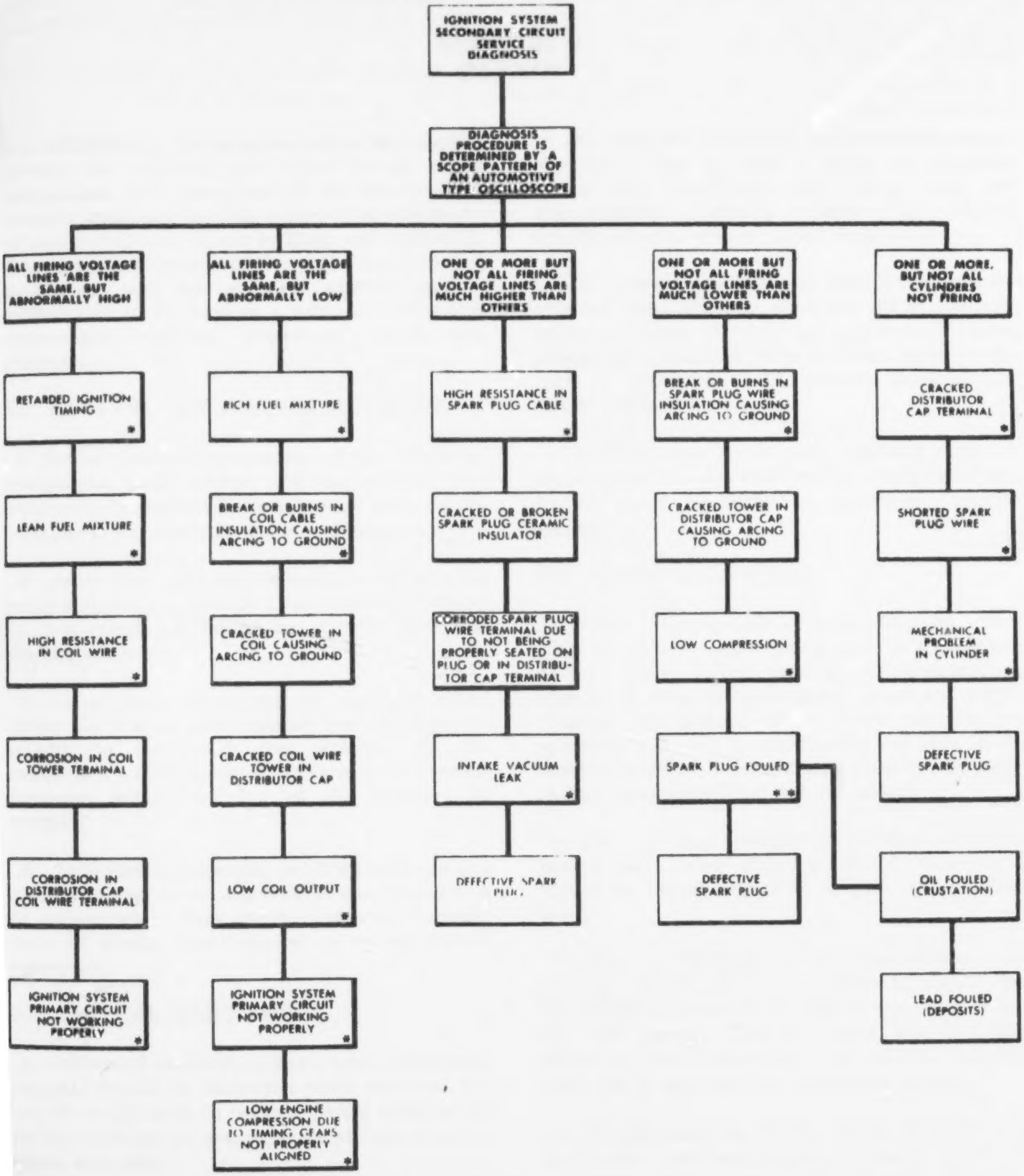
TABLE 4-6. TROUBLES AND REMEDIES (Sheet 14)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
TRANSMISSION (Continued)		
Drive in neutral	Gearshift control cable out of adjustment	Adjust cable for proper position of shift levers (See Section V).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
	Clutch Failure	Disassemble, clean and repair (See Section V).
Drags or locks up	Kickdown band out of adjustment	Adjust kickdown band (paragraph 4-77).
	Low and reverse band out of adjustment	Adjust low and reverse band (paragraph 4-78).
	Kickdown servo failure	Disassemble, clean and repair (See Section V).
	Low and reverse servo failure	Disassemble, clean and repair (See Section V).
	Clutch failure	Disassemble, clean and repair (See Section V).
Scraping, growling, or ratcheting noises	Extension housing output shaft bearing failure	Replace bearing (See Section V).
	Governor stuck or malfunctioning	Disassemble and repair governor (See Section V).
	Converter drive plate or front oil pump failure	Disassemble and repair or replace (See Section V).
	Clutch failure	Disassemble and repair clutch (See Section V).
Buzzing noises	Low transmission fluids	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Control valves sticking in body	Disassemble and repair control valve assembly (See Section V).
Hard to fill, oil blows out filler tube during operation	Transmission overfilled	Drain excess oil
	Oil strainer clogged	Clean oil strainer, refill with clean fluid (paragraph 4-19).
	Control valves sticking in body	Disassemble and repair control valve assembly (See section V).

TABLE 4-6. TROUBLES AND REMEDIES (Sheet 15)

TROUBLE	PROBABLE CAUSE	REMEDIAL ACTION
TRANSMISSION (Continued)		
Hard to fill, oil blows out filler tube during operation (continued)	Transmission vent clogged	Clean vent to remove obstruction.
	Front pump failure	Disassemble and repair pump (See Section V).
Transmission overheats	Low transmission fluid level	Add fluid to bring level to full mark on dipstick (paragraph 4-19).
	Kickdown band out of adjustment	Adjust kickdown band (paragraph 4-77).
	Low and reverse band out of adjustment	Adjust low and reverse band (paragraph 4-78).
	Oil cooler clogged	Clean radiator and oil cooler (paragraph 4-26).
	Control valves sticking in valve body	Disassemble and repair valve body (See Section V).
	Front pump failure	Disassemble and repair pump (See Section V).
	Clutch failure	Disassemble, clean and repair (See Section V).
Starter will not engage	Gearshift control cable out of adjustment	Adjust cable for proper position of shift levers (See Section V).
	Neutral starting switch defective	Replace.

TABLE 4-7. IGNITION SYSTEM SECONDARY CIRCUIT TROUBLESHOOTING GUIDE


IGNITION SYSTEM SECONDARY CIRCUIT SERVICE DIAGNOSIS
DIAGNOSIS PROCEDURE IS DETERMINED BY A SCOPE PATTERN OF AN AUTOMOTIVE TYPE OSCILLOSCOPE
ALL FIRING VOLTAGE LINES ARE THE SAME, BUT ABNORMALLY HIGH
RETARDED IGNITION TIMING *
LEAN FUEL MIXTURE *
HIGH RESISTANCE IN COIL WIRE *
CORROSION IN COIL TOWER TERMINAL
CORROSION IN DISTRIBUTOR CAP COIL WIRE TERMINAL
IGNITION SYSTEM PRIMARY CIRCUIT NOT WORKING PROPERLY *
ALL FIRING VOLTAGE LINES ARE THE SAME, BUT ABNORMALLY LOW
RICH FUEL MIXTURE *
BREAK OR BURNS IN COIL CABLE INSULATION CAUSING ARCING TO GROUND *
CRACKED TOWER IN COIL CAUSING ARCING TO GROUND
CRACKED COIL WIRE TOWER IN DISTRIBUTOR CAP
LOW COIL OUTPUT *
IGNITION SYSTEM PRIMARY CIRCUIT NOT WORKING PROPERLY *
LOW ENGINE COMPRESSION DUE TO TIMING GEARS NOT PROPERLY ALIGNED *
ONE OR MORE BUT NOT ALL FIRING VOLTAGE LINES ARE MUCH HIGHER THAN OTHERS
HIGH RESISTANCE IN SPARK PLUG CABLE *
CRACKED OR BROKEN SPARK PLUG CERAMIC INSULATOR
CORRODED SPARK PLUG WIRE TERMINAL DUE TO NOT BEING PROPERLY SEATED ON PLUG OR IN DISTRIBUTOR CAP TERMINAL
INTAKE VACUUM LEAK *
DEFECTIVE SPARK PLUG
ONE OR MORE BUT NOT ALL FIRING VOLTAGE LINES ARE MUCH LOWER THAN OTHERS
BREAK OR BURNS IN SPARK PLUG WIRE INSULATION CAUSING ARCING TO GROUND *
CRACKED TOWER IN DISTRIBUTOR CAP CAUSING ARCING TO GROUND
LOW COMPRESSION *
SPARK PLUG FOULED * *
DEFECTIVE SPARK PLUG
ONE OR MORE, BUT NOT ALL CYLINDERS NOT FIRING
CRACKED DISTRIBUTOR CAP TERMINAL *
SHORTED SPARK PLUG WIRE *
MECHANICAL PROBLEM IN CYLINDER *
DEFECTIVE SPARK PLUG
OIL FOULED (CRUSTATION)
LEAD FOULED (DEPOSITS)

* ALL TESTS AND REPAIRS ARE DESCRIBED IN APPROPRIATE SECTION OF SERVICE MANUAL.

** SPARK PLUGS DO NOT FOUL BY THEMSELVES. CHECK FOR WHAT CAUSED PLUG TO FOUL. INSTALLING NEW SPARK PLUGS WILL NOT CORRECT FOULING CONDITION.

SECTION V
REPAIR

5-1. GENERAL. Instructions within this section provide for removal and repair of all major components and assemblies of the vehicle. It is assumed that organizations undertaking such depth of repair shall have proper facilities and equipment for proper performance of the work. The following paragraphs 5-2 through 5-8 provide general instructions to be used as a guide in performing disassembly, cleaning, inspection, repair, and reassembly.

5-2. GENERAL REMOVAL INSTRUCTIONS.

a. Before attempting removal of any electrical component, make certain that the system is not energized. Disconnect battery ground strap before working on any electrical system component.

b. Insure that adequate clearance is available for removal of the component. Disassemble the vehicle to the extent necessary to provide adequate working clearance.

c. Use a chain hoist, jack or other aid when lifting the heavier components. The lifting device should be positioned and attached to the component to remove all strain from the mounting hardware before the last of the hardware is removed.

d. To facilitate reassembly and installation, apply identifying tags to mating ends of electrical wiring or connectors as they are disconnected. Identify parts of similar configuration to insure correct reassembly.

5-3. GENERAL DISASSEMBLY.

a. Preformed packings, gaskets, seals, and similar material should be discarded when removed. Do not use metal tools to remove sealing material. To prevent damage to mating surfaces, use wood or plastic as probes.

b. Cotter pins, lockwashers, lockwire, self-locking nuts, and any similar locking devices shall be discarded when removed.

c. To facilitate reassembly and installation, apply identifying tags to mating points of electrical wiring and connectors, etc., when they are disconnected. Identify parts of similar configuration to ensure correct reassembly.

d. To prevent moisture and foreign matter from entering open housings, lines, and other openings, apply protective covers as soon as practicable after disassembly. Wrap all parts in clean paper or dip parts in preservative oil, Military Specification MIL-C-8188, or equivalent.

e. Remove only those parts requiring repair or replacement. Do not disassemble a component any further than necessary to accomplish needed repairs.

5-4. GENERAL CLEANING.

a. When cleaning ball or roller bearings, place them in a basket and suspend them in a container of dry cleaning solvent overnight. If necessary, use a brush to remove caked grease, chips, etc. Avoid rotating the bearing before solid particles are removed to prevent damaging races and balls. When bearings have been cleaned, spin them immediately in light lubricating oil to remove solvent.

b. Do not clean preformed packings or other rubber parts in dry cleaning solvent. These parts should be wiped clean with a clean, dry, lint-free cloth.

c. Prior to disassembly of the vehicle, the exterior parts of the equipment should be thoroughly cleaned to remove accumulated mud, tar, and grease. This procedure will facilitate inspection and disassembly. For cleaning exterior parts, use a vapor pressure spray rinse cleaner.

d. For cleaning the exterior of the engine, frame and hoods, use Gun, Engine, Kerosene Spray, or equivalent. Use Compound, Aircraft Cleaning, Military Specification MIL-C-25769, in a mixture consisting of one part compound with four to nine parts dry cleaning solvent, Federal Specification

P-D-680. Allow application to remain on item surface for approximately 10 minutes before rinsing. Rinse with hot or cold water under pressure. If available, use hot water under 80 to 120 pounds pressure. An ordinary garden hose with nozzle may be used if other equipment is not available. Rinse thoroughly.

CAUTION

> Do not clean tires, lubricant seals, rubber hoses, or electrical components with preceding cleaning agent.

e. Electrical parts, such as coils, junction blocks, switches, and wiring, incorporating insulating materials should not be soaked or sprayed with cleaning solutions. Clean these parts with a clean, lint-free cloth moistened with dry cleaning solvent, Federal Specification P-D-680.

f. Oil and fuel tanks and similar reservoirs should be flushed, using a spray gun and drying cleaning solvent.

CAUTION

> Do not use soap or alkalies for cleaning tank interiors.

g. The cooling system radiator core should be cleaned with steam or hot water. If sediment within the core cannot be completely removed by this method, the core may be boiled in a solution of sodium carbonate and water. Use a solution of one pound of sodium carbonate, Federal Specification O-S-571, to each gallon of water. Flush with clean, hot water, or steam.

h. The electrical system battery exterior surfaces should be cleaned with a weak solution of baking soda and water. Apply the solution with a bristle brush to remove any corrosive buildup on the battery cable clamps and terminals and battery tray.

i. Wash painted surfaces of vehicle with a solution consisting of 1/4 lb. of soap chips, Federal Specification P-S-579, to 1 gallon of water.

5-5. GENERAL INSPECTION.

a. Examine bearings for rusted or pitted balls, races, or separator. Examine balls and races for brinnelling, abrasion, and serious discoloration. The following are causes for bearing rejection:

1. Cuts or grooves parallel to ball or roller rotation.

2. Fatigue pits (as opposed to minor machine marks or scratches).

3. Cracks detected during magnetic particle inspection.

Note

> Excluding defects which may cause bearing binding or misalignment, nicks or gouges outside race load areas are not cause for rejection.

b. Inspection consists of checking for defects such as physical distortion, wear, cracks, and pitting, and checking dimensions of parts for compliance with maximum wear limits data. Parts subjected to heavy load or pressure shall be inspected more thoroughly by performing surface temper, magnetic particle, or fluorescent penetrant procedures where necessary. Clean all parts before inspection.

c. When removing drain plugs from transmission, engine, steering gear or differential, inspect the sediment adhering to the plug. Accumulations of grit and/or fine metal particles may indicate actual or potential component failure. A few fine particles are normal. This inspection is effective in determining defective parts prior to internal inspection of the component, and to predict degradation of the equipment.

d. Gears should be inspected upon removal for the following conditions:

1. Normal wear in excess of practical limits.

2. Pitting of teeth due to extreme pressure loading.

3. Abrasive wear due to foreign materials in lubricant.

4. Scoring, seizing, and galling of teeth due to excessive loads and clearance.

5. Burning and loss of temper due to extreme high temperature operation. Caused by excessive friction and lack of lubrication.

6. Rolling or plastic yielding due to extreme loads over a long period.

7. Cracks and fractures due to shock-loading.

Note

> If visual inspection proves the service of gears doubtful, perform a surface temper or magnetic particle inspection, or both.

e. Inspect shaft splines for wear, pitting, rolling or peening, and for fatigue cracks. In many instances, the same inspection procedure will apply as for gears. However, the condition, if ever present, will in most cases be much less pronounced. When doubtful of the actual serviceable condition of splines, perform a magnetic particle inspection.

f. Check all hose surfaces for broken or frayed fabric. Check for breaks caused by sharp kinks or rubbing against other parts of the truck. Inspect copper tubing lines for kinks. Inspect the fitting threads for damage. Replace any part found defective. Following reassembly and during initial truck operation period, check for leaks.

g. Visually inspect all castings and weldments for cracks. Parts upon which great stress is placed may be inspected further, using the magnetic particle inspection method. Critical non-ferrous parts may be fluorescent penetrant inspected.

h. Inspect all harnesses for chaffed or burned insulation. Inspect all terminal connectors for loose connections and broken parts.

5-6. GENERAL REPAIR.

5-7. Repair procedures are presented in the following paragraphs for all the major components of the vehicle. This material is presented, grouped under each major component, in the following order: removal, disassembly, inspection, repair and eassembly.

a. Remove burrs from gear teeth with a fine-cut ile or hand grinder.

b. Alternator slip rings and starter commutators ay be polished in a lathe, using a strip of 00 ndpaper. After polishing, blow all dust and esidue from commutator with compressed air.

c. Chassis and exterior painted parts may be resurfaced where paint is damaged, or where parts have been repaired, by using an abrasive disc driven through a flexible shaft.

CAUTION

> Suitable precautions should be taken to guard other parts of the vehicle from abrasive dust. The operation should not be performed near exposed working parts and all openings which would allow the dust to reach working parts should be masked.

d. Remove residue and oil stain from bearing races with crocus cloth.

e. Lock wires, lockwashers, cotter pins and similar securing devices, together with gaskets and oil seals should be replaced with new items during assembly.

f. Prior to resurfacing, scrape off loose and blistered paint from damaged areas. Clean area to be painted by sanding or buffing. Remove residue cleaning material with paint thinner, Federal Specification TT-T-306, and dry thoroughly.

g. During repair operations, bare steel surfaces shall be protected from oxidation when not actually undergoing repair work, i.e., while awaiting any repair step, reinspection or reassembly. Such protection shall be accomplished by dipping the parts in, or spraying them with corrosion preventive compound, Military Specification MIL-C-6259. The same protective coating shall be applied to other metals, if necessary to prevent oxidation under climatic or atmospheric conditions prevailing. Aluminum parts may require protection in atmospheres having a high salt content. Steel parts must be protected in all instances.

Note

> The above instruction is applicable to polished and machined steel parts not protected by cadmium, tin, copper, or other plating or surface treatment. Bare metal surfaces must be free of moisture when applied. Acid present in perspiration and skin oils may attack steel surfaces if fingerprints are not removed. Dip parts in fingerprint remover compound, Military

Specification MIL-C-15074, after handling, to prevent such action.

h. Welding and brazing processes may be employed for the repair of cracks in external steel parts, such as brackets, panels, and light framework. However, the time required, the difficulty of working with the metal, and the chance of embrittlement and subsequent failure make such repairs of questionable value. Hence they should be attempted only when replacement parts are not available. Welding and brazing of castings and running parts or parts to which great stress is applied is not permissible, except in emergencies.

i. Replace all broken, worn, or burned electrical wiring. Wires on which several strands are broken must be replaced. Broken strands will increase the resistance of the wire and impair efficiency of the electrical components, especially the ignition system.

j. Replace all broken, frayed, crimped, or soft flexible lines and hoses. Replace fittings which are stripped or damaged. Replace entire flexible hose if fittings are damaged. Make sure the hose clamps do not crimp hoses.

k. Replace any bolt, screw, nut, or fitting on which threads are damaged. Inspect tapped holes for thread damage. If cross-threading or spalling is evident, retap the hole for the next oversize screw or stud. When retapping will result in weakening the part, or when the cost of the part makes retapping impractical, replace the damaged part. At times, merely chasing the threads with the proper size tap or die will be adequate.

5-8. GENERAL REASSEMBLY.

a. Remove protective grease coatings from new parts prior to installation.

b. To replace a preformed packing, first dovetail groove, then stretch packing and place into position. Rotate component on flat surface, applying a downward pressure to uniformly press the packing into position.

c. To provide added sealing for gaskets, coat both sides with Permatex Super 300 gasket sealant (Permatex Co., Inc., West Palm Beach, Fla.) or equivalent. Be sure that all traces of previous gasket and sealant are removed before installing new gasket.

d. Install oil seals with seal lip facing in, applying an even force to the outer edge of seal. Coat oil seals evenly with oil or grease before installing. If oil seals are to be installed over keyed or splined shafts, use a guide to prevent sharp edges of the keyway of splines from cutting the leather or neoprene seal. Guides can be constructed of very thin gage sheet metal and shaped to the required diameter. However, make certain the guide edges are not sharp and are bent slightly inward so they do not cut the seal.

e. During reassembly of shafts and bearings in housings, first mount bearing on shaft, then install the assembly by applying force to the shaft. When mounting bearings on shafts, always apply force to the inner races.

f. Lubricate all preformed packings with a thin coating of light mineral oil before installation.

g. Lubricate bearings prior to reassembly with the type of lubricant normally used in the related housing or container. This will provide lubrication during the first run-in until lubricant from the system can reach the bearings.

5-9. TABLE OF INSPECTION, REPAIR, AND REASSEMBLY.

5-10. The Table of Inspection, Repair, and Reassembly (Table 5-1) tabulates components, assemblies, and accessories of the vehicle with brief descriptions of repair and reassembly.

5-11. INSPECTION. The inspection column makes reference to general inspection procedures, and, where necessary, specific procedures to be followed in the examination of a particular component. Refer to Table 5-1 for inspection procedures.

5-12. REPAIR AND REASSEMBLY. Unless lengthy and detailed repair and reassembly instructions are required due to the complexity of a particular component, Table 5-1 will provide necessary reference to exploded view illustrations, found in Section VI, for reassembly of components. Specific details of reassembly, using the exploded views, will be provided where necessary. If additional instructions are required, reference will be made to the pertinent paragraphs in the table.

TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 1)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Frame, Hood, Covers and Floor Plates	Check for dents, cracks, corrosion, broken welds or damaged mounting holes.	Straighten dents; repair cracks by welding. Sand, prime, and repaint corroded areas. Use touch-up paint to cover scratched or scuffed areas, and discoloration caused by welding repair. Replace any badly damaged or corroded parts. Reassemble or install each part as shown in figure 6-49.
Radiator	Check for leakage and pressure test. Check for bent fins in radiator core.	Repair leaks by soldering. Straighten bent fins using small needle nose pliers. Steam clean radiator core to remove dust and debris.
Cooling System (See figure 6-2)	Check thermostat operation. Check radiator cap	Replace defective thermostat. Replace defective cap.
	Check radiator hoses	Replace cracked, soft, or leaking hose.
Fuel Tank and Fuel Lines	Check tank for dents, evidence of leakage at seams or fittings. Check fuel line for cracks at bends, leakage at fittings.	WARNING: If tank is to be repaired by welding, flush thoroughly and fill with water to expel all gasoline fumes. Install as shown in figure 6-3.
Exhaust System	Check all parts for cracks or corroded areas.	Replace any damaged or defective parts.
	Check for bent or dented pipe or muffler.	Install as shown in figure 6-4.
	Check clamps and hangers for corrosion and damage.	Check all connections for leaks and tighten clamps and hangers as required.

TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 2)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Electrical System	Check all wiring and cable connections to insure that these are clean and tight.	Tighten any loose connections. Tape any exposed wiring or replace wires having damaged insulation.
	Check all wiring for cracked, chafed or burned insulation	Replace any burned-out bulbs, damaged wire terminals, or defective switches.
	Check all switches and lights for proper operation.	See figure 6-5 for installation.
Steering Gear	Refer to paragraph 5-19	Refer to paragraph 5-20. See figure 6-8.
Seat and Seat Adjusters	Check mounting hardware for security.	Tighten loose mountings; replace any missing hardware.
	Check adjuster mechanism for wear or damage.	Repair and lubricate adjuster mechanism.
	Inspect seat and back cushions for torn upholstery or stitching.	Stitch torn seams or replace cushion assembly.
Brake System (See figure 6-12)	Check for damaged brake line tubing or fittings.	Replace any damaged tubing or fittings.
	Check operation of stoplight switch.	Replace a defective stoplight switch. Bleed brakes after completing any repair to brake lines, fittings or components
Master Cylinder (See figure 6-12)	Check for pitting, wear or scoring in master cylinder bore. See paragraph 5-25.	Replace a badly worn or scored body casting. Master cylinder bore may be "cleaned up" by honing, provided piston-to-bore clearance after honing does not exceed 0.007 inch. Reassemble as outlined in paragraph 5-26.

TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 3)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Front Axle	Check for bent or warped condition. Check for excessive wear at kingpins.	If not badly warped or bent, cold-straighten axle beam to bring ends or spring seats into alignment. Replace worn kingpin bushings.
Front Axle Steering Knuckle	Check for cracks, bent or otherwise deformed areas, and damaged bearing and seal surfaces on the spindle.	Replace a damaged steering knuckle. Install as shown in figure 6-17.
Tie Rod Assembly	Check tie rod for cracks or bent condition. Inspect threads for damage.	Replace all defective parts. Reassemble as shown in figure 6-18. Check and adjust wheel alignment.
Rear Axle and Reduction Gear Case	Check cast housings for cracks or warped flanges, or evidence of leakage.	Replace damaged parts. Replace damaged or worn bearings. Refer to paragraph 5-38 for repair and reassembly instructions.
Ring Gear	Check gear teeth as shown in paragraph 5-5. Inspect for cracks in ring gear or differential case. Perform magnetic particle inspection as outlined in paragraph 5-13.	Replace defective ring gear. Note: Always replace ring gear and pinion as a set. Reassemble as shown in figure 6-21.
Rear Axle Shaft	Check axle shaft for twisted condition, damaged splines or bearing seating surfaces. Perform magnetic particle inspection as outlined in paragraph 5-13.	Replace a damaged axle shaft. Install as shown in figure 6-21.

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TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 4)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Rear Axle Pinion	Check pinion gear teeth in accordance with procedures outlined in paragraph 5-5.	Remove minor nicks or burrs with a fine mill file, India oilstone or crocus cloth. Replace a defective pinion gear.
	Inspect spline teeth in accordance with paragraph 5-5.	Note: Always replace pinion and ring gear as a set.
	Perform a magnetic particle inspection as outlined in paragraph 5-13.	Reassemble as shown in figure 6-21.
	Check bearing and oil seal contact surfaces for nicks or burrs.	Refer to paragraph 5-38.
Reduction Gearcase	Refer to paragraph 5-37.	Refer to paragraph 5-38.
Brake Assembly (See figure 6-22)	Inspect all springs for distortion and loss of tension. Check adjuster parts for damaged threads and bent linkage parts. Inspect anchor pins for scoring, wear or evidence of binding. Check shoes for worn lining, cracked or bent shoe web or table.	Replace all defective parts. Refer to paragraph 5-44 and figure 6-22.
Brake Drums	Check for scoring, cracks, out-of-round, or excessive wear.	Refinish drums to remove light scoring and true up lining contact surface. Replace a badly damaged drum.
Wheel Cylinders	Check wheel cylinder bore for pitting, scoring or wear patterns. Refer to paragraph 5-43.	Hone a slightly pitted or scored cylinder to remove markings. Replace a badly worn cylinder.

TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 5)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Propeller Shaft (See figure 6-23)	Check yokes and shaft for cracks or other physical damage. Check bearing races and rollers for excessive wear or damage. Check spider bearing surfaces for scoring or wear.	Replace defective parts and reassemble as shown in figure 6-23.
Air Cleaner	Check the cover and lower body sealing surfaces for cracks or deformed areas which might cause leakage.	Replace damaged or defective air cleaner.
Carburetor Assembly (See figure 6-26)	Check all parts, after a thorough cleaning, for cracks, wear, distortion or other obvious defects. Inspect in accordance with paragraph 5-52	Replace all gaskets during the overhaul. Replace all parts known or suspected to be defective. Reassemble as outlined in paragraph 5-53 and perform all adjustments as outlined in Section IV. Install the carburetor as shown in figure 5-14. Check for leakage.
Alternator Assembly (See figure 6-27)	Inspect the alternator as outlined in paragraph 5-70. Check the diodes as outlined in paragraph 5-70.	Reassemble the alternator as outlined in paragraph 5-71. Replace all defective parts.
Starting Motor (See figure 6-30)	Inspect the starting motor assembly in accordance with paragraph 5-86. Perform an armature and field grounded test.	Reassemble the starting motor according to the instructions in paragraph 5-87. Replace all defective parts.

TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 6)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Fuel Pump	Inspect the fuel pump for for signs of leakage or wear. Check camshaft rocker arm for worn spot. Check body for cracks.	Replace a defective pump.
Engine Mounts	Check the area of the bond between the rubber and metal for evidence of deterioration. Check for cracks or other defects in the metal portion of the engine mount.	Replace defective or damaged engine mount. Install as shown in figure 6-25.
Water Pump Assembly (See figure 6-28)	Check the seal and gasket surfaces of the housing for cracks, nicks or burrs.	Remove nicks and burrs with a fine mill file or oilstone. Replace a cracked housing. Refer to paragraph 5-59 for reassembly procedures. Refer to paragraph 5-60 for installation instructions.
Distributor Assembly (See figure 6-29)	Inspect in accordance with paragraph 5-77.	Replace all defective parts and reassemble the distributor as outlined in paragraph 5-78. Install and time the distributor as outlined in paragraph 5-79.
Oil Pump Assembly (See figure 6-34)	Inspect the oil pump as outlined in paragraph 5-98.	Reassemble the oil pump as shown in figure 6-34. Refer to figure 6-33 for installation.
Oil Filter Assembly	Check for cracks, nicks or burrs in the filter adapter.	Remove nicks or burrs with a fine mill file or oilstone. Replace a cracked adapter.
Valves and Valve Springs (See figure 6-35)	Inspect the valves as outlined in paragraph 5-104. Inspect the valve springs as outlined in paragraph 5-106.	Refacing procedures for the valves are covered in paragraph 5-105. Replace weak or distorted valve springs.

TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 7)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Push Rods	Inspect the push rods for wear and bent condition.	Replace bent or worn push rods.
Rocker Arm and Shaft Assembly (See figure 5-50)	Inspect the rocker arm and shaft assembly for worn or bent parts and replace as necessary.	Reassembly of the rocker arm and shaft assembly is covered in paragraph 5-108.
Cylinder Head	Inspect in accordance with paragraph 5-104.	Repair procedures are covered in paragraphs 5-104 and 5-105. Reassemble the cylinder head and valve mechanism as outlined in paragraph 5-107. Installation of the cylinder head is covered in paragraph 5-108.
Timing Chain and Sprockets	Inspect the fuel pump drive eccentric for scores, nicks and excessive wear. If the eccentric is scored, replace it. Check timing chain stretch as outlined in paragraph 5-113.	Replace damaged or worn timing chain and sprockets.
Cylinder Block Front Cover	Check for cracks and warped gasket surface. Check seal bore for nicks or burrs which will prevent proper seating of the seal.	Remove nicks and burrs with an oilstone. Replace a cracked cover. Reassembly and installation are covered in paragraphs 5-114 and 5-115.
Crankshaft Damper	Check damper hub seal contact surfaces for nicks or burrs which might damage the seal or cause premature wear and seal failure.	Dress out nicks or burrs with a fine oilstone or crocus cloth. Lubricate the hub of the crankshaft damper to prevent damage to the seal during installation or initial engine start up. Install the damper on the crankshaft. Torque the retaining bolt to 80-100 foot-pounds.

TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 8)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Flywheel and Ring Gear	Check face and gear runout. Also check for broken or missing gear teeth	Position the flywheel against the end of the crankshaft. Apply an oil-resistant sealer to the retaining bolts and install the bolts. Torque the bolts, in sequence, 180° apart, to 75-85 foot-pounds.
Pistons and Connecting Rods (See figure 6-36)	Inspect pistons in accordance with paragraph 5-123. Inspect connecting rods in accordance with paragraph 5-124. Inspect connecting rod bearings in accordance with paragraph 5-125.	Reassembly procedures are covered in paragraphs 5-124 and 5-125. Refer to paragraph 5-129 for installation instructions.
Crankshaft and Related Parts (See figure 6-38)	Inspect crankshaft in accordance with paragraph 5-126.	Repair as outlined in paragraph 5-126. Reassembly is outlined in paragraphs 5-127 and 5-128.
Cylinder Block	Inspect cylinder block for cracks or other damage. Inspect cylinder bores for scoring or excessive wear. Refer to paragraph 5-122 for detailed procedures.	Refer to paragraph 5-122.
Camshaft and Bearings (See figure 6-37)	Inspect camshaft lobes and bearing journals for signs of abnormal wear. Check the distributor drive gear for broken or chipped teeth.	Refer to paragraph 5-119.
Torque Converter (See figure 6-48)	Check ring gear for worn, broken or missing teeth.	See paragraph 5-164. Flush torque converter as outlined in paragraph 5-149.
Reaction Shaft and Front Pump (See figure 6-48)	See paragraph 5-155.	See paragraph 5-155.

TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 9)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Front Clutch (See figure 6-45)	Inspect all clutch plates for warped condition. Replace any plate which is not flat. Composition plates must not be cleaned in any vapor degreaser or detergent solution. Make certain the disc spring is not cracked or broken.	See paragraph 5-156.
Rear Clutch (See figure 6-46)	Inspect all clutch plates for warped condition. Replace any plate which is not flat. Composition plates must not be cleaned in any vapor degreaser or detergent solution. Make certain the piston return springs are not cracked, broken or distorted.	See paragraph 5-157.
Output Shaft and Gear Train (See figure 6-47)	See paragraphs 5-158 and 5-159.	See paragraphs 5-158 and 5-159.
Kickdown Servo (See figure 5-103)	See paragraph 5-160.	See paragraph 5-160.
Low Reverse Servo (See figure 5-104)	See paragraph 5-161.	See paragraph 5-161.
Governor and Oil Distributor (See figure 6-44)	Inspect the governor valves and housing bore for wear patterns, nicks or scoring. Install the valves in the governor housing and check for free movement. The valves should fall of their own weight when dry.	Crocus cloth may be used to polish the valves if care is taken to avoid rounding the sharp edges of the valve. Refer to paragraph 5-162 for detailed reassembly procedures.

TABLE 5-1. INSPECTION, REPAIR AND REASSEMBLY PROCEDURES (Sheet 10)

ITEM TO BE REPAIRED	INSPECTION DATA	REPAIR AND REASSEMBLY PROCEDURE
Control Valve Body (See figure 6-41)	Inspect all valve and plug bores for scoring. Check all fluid passages for freedom from obstruction. Inspect check valve parts for freedom of movement. Inspect all machined mating surfaces for burrs or distortion. Inspect all plugs and valves for burrs and scoring. Insert each valve end plug into its respective bore and make certain that it falls out from its own weight. Inspect parts in accordance with the data given in paragraph 5-163.	See paragraph 5-163 for detailed reassembly procedures. Crocus cloth can be used to polish valves and plugs if care is taken to avoid rounding the sharp edges of the valves and plugs.
Transmission Case and Linkage (See figure 6-39)	Inspect the case for cracks. With an air hose or thin flexible wire, check all fluid passages and the vent for obstructions or cross leakage. Check all case linkage parts for damage or distortion.	See paragraph 5-164.

5-13. MAGNETIC PARTICLE INSPECTION. A magnetic particle inspection may be performed on steel parts which are not 100 percent replaceable and only if the inspection is deemed necessary. Such steel parts that have been reworked or reground, or parts containing areas where fatigue can be expected, may be tested. Shear sections and reground contact surfaces shall show no defects. Any evidence of cracks is cause for rejection. Since some stainless steel materials cannot be magnetized, do not perform this inspection on such parts. This inspection shall be performed on all parts as specified in Military Specification MIL-L-6870 by certified operators and inspectors. Equipment, maintenance, and operations shall be in accordance with Military Specification MIL-I-6868. On completion of inspection, pass parts through a demagnetizing field. Then wash and airblow dry.

Note

> Magnetizing amperage depends on parts being inspected. For solid section parts, amperage shall be 1000 amp per diameter-inch. For variable diameter thickness, amperage shall be adjusted for diameter inspected.

5-14. Parts shall be rejected: If there are indications of non-metallic inclusions (foreign body — gaseous, liquid or solid) longer than one inch; if all indications total more than two inches; or if indications are closer than 1/8 inch apart. Parts shall also be rejected if the following patterns appear:

a. Bursts — scattered, short sharp lines. Bursts are caused by working metals at temperatures that weaken and rupture material. Such discontinuities usually are internal. They seldom are detected by magnetic particle inspection until surface is cut to burst area.

b. Flakes — separate short wavy lines, usually in same general direction. Flakes are caused by improper cooling. Such discontinuities are usually internal. They seldom are detected by magnetic particle inspection until surface is cut to flake area.

c. Grinding cracks — fine, sharp lines, tightly packed. On some surfaces, cracks may be shallow and hard to see. Grinding cracks are usually caused by a glazed wheel. Instead of cutting, wheel rubs surface and overheats part. Such discontinuities are thermal cracks similar to heat-treat and hardening cracks. Grinding cracks also may be caused by too little coolant, too much feed, or too much speed.

5-15. COMPONENT REPAIR.

5-16. STEERING GEAR.

5-17. REMOVAL. (Refer to figure 6-7.)

a. Remove floorplate at steering column base to expose steering gear and mounting hardware.

b. Remove nuts and lockwashers from U-bolt securing upper part of steering column.

Note

> If steering wheel is to be removed, pry off horn button and remove large hex nut from wheel hub, and use a steering wheel puller to remove steering wheel before loosening upper steering column clamp as outlined in step b above.

c. Working from underneath the vehicle, disconnect the drag link from the steering gear pitman arm.

d. Remove pitman arm from steering gear output shaft.

e. Remove the three hex head capscrews and locknuts securing the steering gear to the machine frame, and remove the steering gear and column as an assembly.

5-18. DISASSEMBLY. (Refer to figure 6-8.)

a. Remove drain plugs and drain all lubricant from housing. Loosen clamp at base of column and remove jacket-tube assembly.

b. Center the gear by positioning the input shaft in the mid-point of its travel, and remove the four side cover capscrews (19).

c. Remove rollershaft (21) and shaft cover (18). It may be necessary to tap cover lightly, or the exposed end of the output shaft, with a rawhide or fibre mallet to break cover away from housing.

d. Remove old side cover gasket (20). Separate shaft cover (18) from rollershaft assembly (21) by removing lock nut (17) and turning adjustment screw (24) clockwise.

e.- Remove worm cover capscrews (10) and worm cover (9). Peel off or remove worm cover shims (11).

f. Remove lower worm bearing cup (16) and bearing (15) by pressing downward on worm to force these parts from housing.

CAUTION

If bearing cup cocks or binds in housing, do not force out. Tap bearing lightly to reseat, and repeat step f.

g. Lift out worm and input shaft (13) and separate upper bearing from shaft.

h. Remove and discard old oil seals (25).

5-19. CLEANING AND INSPECTION.

a. Clean all parts in accordance with general cleaning instructions as outlined in paragraph 5-4.

b. Carefully inspect worm and roller teeth for excessive wear which would create an unsatisfactory lash condition upon reassembly.

c. Inspect rollershaft bearings and sealing surfaces for wear and/or pitting. Bearing and sealing surfaces may be lightly polished with a very fine abrasive paper, if necessary.

d. Inspect bearing races and cups on each end of worm for pitting or brinelling. If bearing races or cups are not in good condition, replace with new parts.

e. Check rollershaft to bearing clearance, which must not exceed 0.010 inch. If clearance is excessive, reassemble unit with a new housing and cup assembly, or replace bearing cup by driving out old cup from housing, and pressing a new bearing cup (on a piloted mandrel) into bore from outer end of trunnion until outer face of bearing cup is flush with the bottom of the seal counterbore.

f. Check rollershaft clearance in pilot bore of side cover. If clearance exceeds 0.010 inch, replace side cover.

g. If end play of adjusting screw (when secured in place by snap ring and back-up washer) exceeds 0.015 inch, replace with a new adjusting screw, washer, and snap ring.

Note

Excessive end play of the adjusting screw will cause torque readings to be uneven when attempting to make total mesh preload adjustments (paragraph 4-79).

5-20. REPAIR AND REASSEMBLY.

a. Repairs to the steering gear are made through replacement of worm or otherwise defective parts.

b. Refer to the exploded view illustration, figure 6-8, and reassemble the steering gear as follows:

c. Lubricate all parts of the steering gear with clean gear oil, SAE No. 90 weight.

d. Install lower bearing (15) into housing, and seat against lower bearing cup (16).

e. Insert worm and shaft (13) into housing and install upper bearing (15) and bearing cup (14).

f. Install appropriate shims (11) over upper bearing and install worm cover cap (9) and secure with four capscrews (10).

Note

Proper number of shims (11) is determined by following worm preload procedures in paragraph 4-79.

g. When proper shim pack and preload is determined, torque cover bolts to 18 to 22 foot pounds.

h. Assemble adjusting screw (24) into end of rollershaft (21). Secure adjusting screw with thrust washer (23) and snap ring (22).

i. Insert rollershaft adjusting screw into side cover (18) and thread screw into cover (using screwdriver inserted from outside cover) until rollershaft bottoms in the side cover bore. Then back off screw one full turn.

j. Fit gasket (20) to housing and install side cover and rollershaft into gear housing.

k. Install side cover capscrews (19) and torque to 18 to 22 foot pounds.

l. Install new seal (25).

m. Perform rollershaft preload adjustment as outlined in paragraph 4-79.

n. Refill unit with new SAE 90 gear oil, and tighten filler plug.

o. Install jacket tube, if removed, and tighten clamp at base of steering column.

5-21. INSTALLATION.

a. Install steering gear onto frame below operator's compartment, securing with three 1/2 inch capscrews and locknuts. Do not final-tighten these mounting screws until proper alignment of steering column with mounting bracket is obtained.

b. Secure steering column to the bracket by installing the U-bolt, nuts and lockwashers.

c. Tighten three 1/2 inch mounting screws securing the steering gear to the frame.

d. Install pitman arm to steering gear output shaft with gear in centered position. Tighten locknut to secure pitman arm.

e. With front wheels in straight ahead position, connect drag link to steering arm ball stud.

f. Install steering wheel and horn button to top of steering column.

g. Install operator's side floorplate.

5-22. BRAKE SYSTEM MASTER CYLINDER.

5-23. REMOVAL. (Refer to figure 6-12.)

a. Remove rear center floor plate to expose master cylinder and mounting.

b. Disconnect brake lines (16 and 25) from master cylinder (5) outlet ports. Plug, tape, or otherwise seal exposed end of brake lines and ports in the master cylinder to prevent entry of foreign material.

c. Remove the two capscrews which mount master cylinder (5) to the vacuum power unit (1), and remove master cylinder assembly.

5-24. DISASSEMBLY.

a. Care should be taken when clamping the master cylinder body in a vise so that vise pressure will not distort cylinder bore or damage internal parts.

b. Remove filler cap and seal and empty all fluid.

c. Remove snap ring, push rod, and primary and secondary piston assemblies. If necessary, apply air pressure to front reservoir port to assist removal of secondary piston assembly.

d. Refer to figure 5-1. Screw two self-tapping screws, supplied in the repair kit, into the tube seats. Remove tube seats by prying screws with screwdriver.

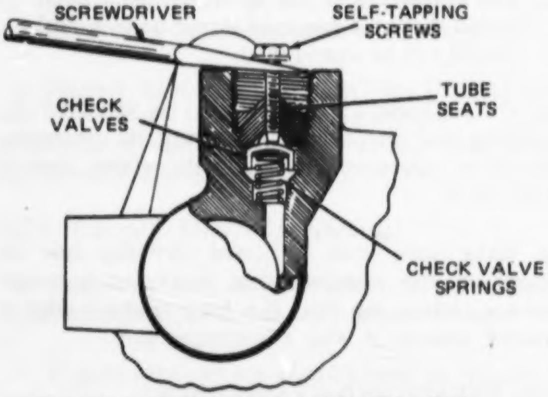


Figure 5-1. Removing or Installing Tube Seats

e. Remove return spring, cup protector, pressure cups, cup protector, and O-ring from secondary piston assembly.

5-25. CLEANING AND INSPECTION.

a. Cylinder castings may be degreased, or cleaned with almost any commercial solvent, provided they are thoroughly rinsed with clean brake fluid to remove all traces of potentially contaminating residue.

b. Use compressed air or lint-free cloth to dry parts after removal from solvent rinse. Do not use cotton waste for drying parts, as particles of lint or thread fibres may block compensating port when the cylinder is placed in service.

c. All hydraulic brake system parts must be thoroughly cleaned and protected, after cleaning, from dust or other air-borne foreign material, until master cylinder is reassembled.

d. After cleaning, hold cylinder casting towards a strong light and sight through cylinder bore. Any visible blemishes, such as scratches, pitting, or visible wear patterns will necessitate replacement of master cylinder assembly.

e. Accumulations of dirt or varnish-like substances, not removed during the general cleaning procedure, may be removed with jewelers rouge or crocus cloth. A hone may be used to "clean up" the cylinder bore, provided its use does not materially increase size of the cylinder bore.

Note

> The possibility of the cylinder having been honed during a previous repair or overhaul should not be overlooked.

f. The cylinder diameter can be checked by inserting the piston and measuring its clearance. Maximum clearance checked with a wire gage is 0.007 inch.

g. Make sure that a honed cylinder has no "burr" at the compensating ports, as it would damage piston cup lips. If a burr or sharp edge is present, remove it with a deburring tool.

5-26 REPAIR AND REASSEMBLY.

a. Repair consists of replacement of defective parts available in repair kit.

b. Coat all parts with clean brake fluid prior to reassembly.

c. Install replacement O-ring, pressure cups, and cup protector on secondary piston; then install return spring into cylinder body.

d. Install secondary piston assembly, spring end first, into cylinder bore.

e. Install primary piston assembly into cylinder bore and secure with replacement snap ring.

f. Position new rubber check valves (figure 5-1) over check valve springs and install in pressure ports, spring end first.

g. Position tube seats (figure 5-1) in pressure ports and install using tube nuts.

h. Insert push rod into master cylinder and install snap ring in groove of master cylinder bore.

i. Fill the master cylinder reservoirs with fluid, then force the piston through one full stroke. Repeat piston stroking until fluid is forced past the check valves and out of the outlet ports. This leaves the master cylinder filled with fluid prior to installing it on the vehicle.

j. Install filler cap and seal.

5-27. INSTALLATION. (See figure 6-12.)

a. Place assembled cylinder against the vacuum power unit (1) and install two capscrews to secure cylinder (5) in place.

b. Connect the brake line fittings (16 and 25) to the pressure ports on the master cylinder (5).

c. Perform pedal freeplay and brake bleeding operations as outlined in Section IV, and install rear center floorplate.

5-28. FRONT AXLE.

5-29. REMOVAL. (Refer to figure 6-17 for exploded view.) Steam clean the area under the vehicle around the front axle and mounting, and proceed as follows:

a. If front wheels are to be removed, make certain to follow the procedures outlined below and illustrated in figure 5-1A.

WARNING

> The front wheels are of the split type. When removing wheels, make certain that tires are completely deflated and valve core is removed. Remove only the bolts on the inner bolts circle to demount the wheel. See figure 5-1A.

b. Raise the front of the vehicle, blocking under frame for support, and remove front wheels and tires as outlined above.

c. Disconnect drag link at ball stud by loosening threaded plug in drag link end.

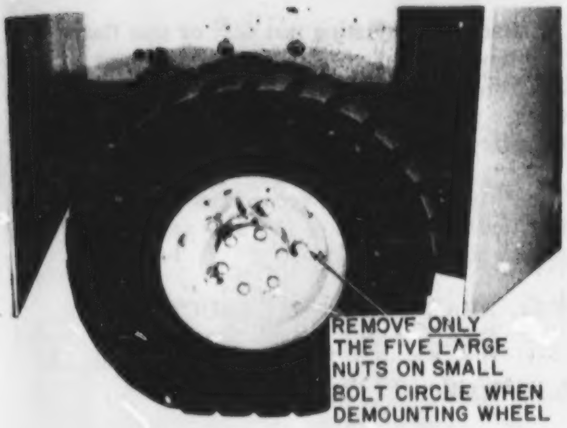


Figure 5-1A. Front Wheel Removal

d. Place an axle jack or other means of support under axle and remove the hex nuts, washers, plates and U-bolts from each mounting pad or spring seat, as shown in figure 5-2.

e. Remove axle from beneath the vehicle.

5-30. DISASSEMBLY. (Refer to figure 6-18.)

a. Remove and disassemble tie rod as shown in the exploded view illustration.

b. Drive out tapered keys (36) from axle ends. Removal of keys will free kingpins (32) for removal. Drive out kingpins downward which will force out plug (45).

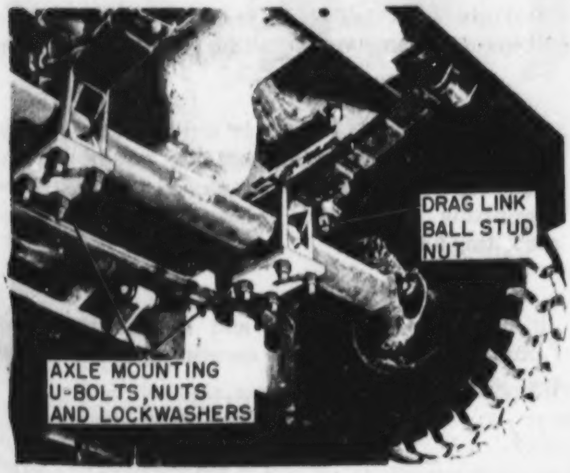


Figure 5-2. Front Axle Mounting

c. Remove all shims (37 and 38) and bearings (39).

d. Press or drive out kingpin bushings (44) with a piloted mandrel.

e. Remove cotter pins (28), nuts (27), and press arms (24 and 25) out of knuckles (42 and 43). Exercise appropriate care not to damage the threads on the arm.

f. Do not remove ball stud (29) unless replacement appears necessary. Remove key (26) and fittings (46).

5-31. CLEANING AND INSPECTION.

a. Refer to general cleaning and inspection procedures of paragraphs 5-4 and 5-5.

b. Probe passages in lubrication fittings with wire to remove hardened grease, and rinse in cleaning solvent. Blow out passages with compressed air.

c. Inspect axle, steering knuckles, steering arm and tie rod for bends, twisting, or other deformation that may have resulted from rough service or collision impact.

5-32. REPAIR AND REASSEMBLY.

a. Repair consists of replacement of parts found to be defective during the inspection process.

b. If axle tube is only slightly bent or warped, it may be cold-straightened to its original configuration. Do not attempt to straighten a badly bent axle tube.

c. Install lubrication fittings (46) in steering knuckles (42 and 43). Insert key (26) in steering arm (25) and insert tapered portion of arm into steering knuckle. Secure arm with castellated nut (27) and new cotter pin (28).

d. Install new kingpin bushings (44) in steering knuckle, using a piloted arbor to prevent bushing collapse during installation.

Note

Bushings are of the pre-sized, oil impregnated bronze type. Do not burnish after installation.

e. Place thrust bearing (39) and one 0.006 inch thick shim on steering knuckle (42), and 0.017 inch thick shim on axle end. Carefully slide steering knuckle over axle end, making sure that bearings and shims remain in place, and insert kingpin (32) through knuckle and axle end.

Note

> Orient kingpin so that the groove is aligned with the hole in the axle end, where tapered key will be installed.

f. Secure kingpin by driving in the tapered key (36) until it is fully seated.

g. Press in expansion plug (45). Install seal (33), seal retainer (34), and clip (35).

h. Press ball stud (29) into steering arm (25), and secure ball stud with nut (30) and new cotter pin (31).

i. Assemble and install tie rod as shown in the exploded view. Use new boots (18) when reassembling.

5-33. INSTALLATION. (See figures 5-2 and 6-17.)

a. Place U-bolts over front springs.

b. Support axle assembly so that it is held against springs while installing plates (12, figure 6-17) and securing with nuts (14) and lockwashers (15).

c. Before tightening U-bolt nuts and lockwashers, make certain that axle is positioned so that the spring center bolts enter recesses made into top of the axle spring seats.

d. Assemble and install drag link. Refer to figure 6-9 for an exploded view of drag link assembly.

e. Install front wheels, hubs and bearings, as shown in figure 4-11. Bearings should be packed with new grease at installation.

f. Install bearing adjusting nut, and while rotating wheel, torque nut to 15 to 20 foot pounds to seat the bearing.

g. Back off adjusting nut 60° or one flat of nut. Tighten locknut to secure adjustment. Check adjustment by rotating wheel. If wheel rotates easily with no noise or noticeable side play, adjustment is satisfactory.

h. Lubricate axle in accordance with lubrication instructions of Section IV, and adjust tie rod for proper toe-in.

5-34. REAR AXLE AND REDUCTION GEARCASE.

5-35. REMOVAL. (Refer to figure 6-19.)

a. Jack up, or hoist the entire vehicle high enough off the work surface to provide adequate working space underneath the frame for axle removal.

b. Support the vehicle, using adequate jack stands or blocking under the frame, making sure that the positioning of these supports will not interfere with axle removal.

c. Remove rear wheels and tires.

d. Disconnect the hydraulic fluid lines from the brake wheel cylinders on each side of the axle. Plug the lines and wheel cylinder ports to prevent contamination of the brake system.

e. Tie brake lines to frame, to prevent bending kinking or other damage. Remove attaching hardware at differential flange, which secures tee fitting to axle.

f. Disconnect propeller shaft from input shaft companion flange on reduction gearcase. See figure 5-3.

g. Position an axle jack, or similar device, under the axle housing to support the assembly once attaching hardware is removed. Adjust the supporting device to relieve strain from the mounting hardware.

h. Refer to figure 5-4 and remove the eight (four each side) locknuts securing the axle to the rear leaf springs.

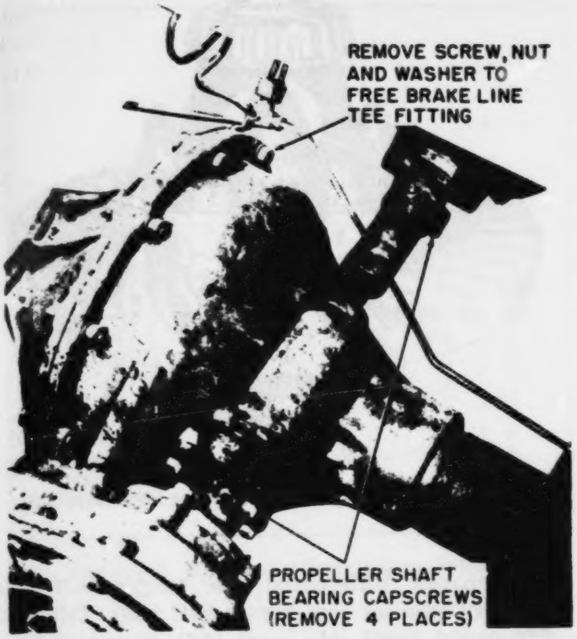

REMOVE SCREW, NUT AND WASHER TO FREE BRAKE LINE TEE FITTING
PROPELLER SHAFT BEARING CAPSCREWS (REMOVE 4 PLACES)

Figure 5-3. Preparation for Axle Removal

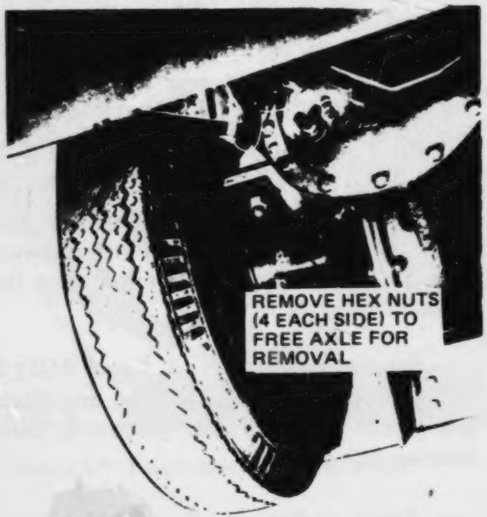


Figure 5-4. Axle Mounting

i. Lower the axle and remove from underneath vehicle.

5-36. DISASSEMBLY (Refer to figures 6-20 and 6-21 for exploded view illustrations.)

a. The gearcase assembly must be disassembled in order to remove it. Refer to figure 6-20 and proceed as follows:

b. Remove four cap screws (3) and lock washers (4) securing input shaft rear cap (2) to gearcase cover (7) and then remove input shaft rear cap. Remove and discard rear cap gasket (11).

c. Remove retaining ring (18) from groove in rear of input shaft (20).

d. Remove 15 hexagon nuts (9), lockwashers (10) and cap screws (8) securing gearcase cover (7) to gearcase housing (25), and withdraw gearcase cover (7). If gearcase cover cannot be withdrawn easily, ball bearing (17) may be a tight fit on input shaft (22). Tap on outer race of bearing using a piece of tubing, and then pull gearcase cover off gearcase housing. Remove and discard gearcase cover gasket (11).

e. Remove two hexagon nuts and nut lock (items 1 and 2, figure 6-21) from bevel pinion. Pull driven gear (12, figure 6-20) off bevel pinion. Remove key.

f. Remove and discard lock wire from gearcase studs. Remove six castellated nuts (32) and flat washers (33) and slide gearcase housing (31) off studs.

g. Once the gearcase assembly has been removed, refer to figure 6-21, and proceed with axle disassembly as follows:

h. Slide brake drums (18) off the wheel mounting studs (23) in rear wheel hubs.

i. Remove cotter pins (22), castellated nuts (20) and flat washers (21) from ends of axle shafts (34 and 35). Discard old cotter pins (22).

j. Pull rear wheel hubs (19) from axle shafts. Removal of wheel mounting studs (23) from hubs (19) is not recommended unless studs are damaged and require replacement.

k. Remove six hex nuts (39), bolts (38), and lockwashers (40) securing brake assemblies (37) to housing. Remove brake assemblies from axle.

l. Remove six capscrews (25) and lockwashers (26) securing oil seal retainers (24) to axle housing. Withdraw oil seal retainers and carefully remove oil seals (27) from retainers.

m. Remove axle shims (29, 30 and 31) from ends of housing and tube assemblies (41 and 50). Note thickness of shims, and number used.

n. Pull axle shafts (34 and 35) with cones and rollers (33) and bearing collars (36) from housing and tube assemblies (41 and 50). Remove outer bearing cup (32) from each axle shaft. Remove inner bearing cup (32) from recess in housing and tube assemblies (41 and 50).

o. Using an arbor press (or other suitable press), remove collar (36) and two cones and rollers (33) from axle shafts.

p. Insert a length of steel rod or pipe with a 1-1/4 inch diameter through left hand housing and tube assembly (41), through differential assembly, and into right hand housing and tube assembly (50) to prevent the differential assembly from falling.

q. Remove 11 hexagon nuts (43), lock washers (44), and machine bolts (42) which secure left hand housing and tube assembly(41) to right hand housing and tube assembly (50). Separate left hand housing and tube assembly (41) from right hand housing and tube assembly (50). Remove and discard housing gasket (45).

r. Drive out thrust block pin (49). Remove thrust block (48) from left hand housing and tube assembly (41).

s. Carefully remove bearing cups (51) from left hand housing and tube assembly (41) and from right hand housing and tube assembly (50). If selective spacers are fitted behind differential bearing cups, wire these spacers to their respective case halves so that they are not lost or interchanged.

t. Carefully slide differential assembly off pipe previously inserted to support the differential assembly. Remove supporting pipe.

u. Place matchmarks on differential case tongue half (54) and on differential case flange half (53) to aid in reassembly. See figure 5-5.

v. Remove and discard lock wire from heads of differential case bolts (55, figure 6-21), then remove bolts.

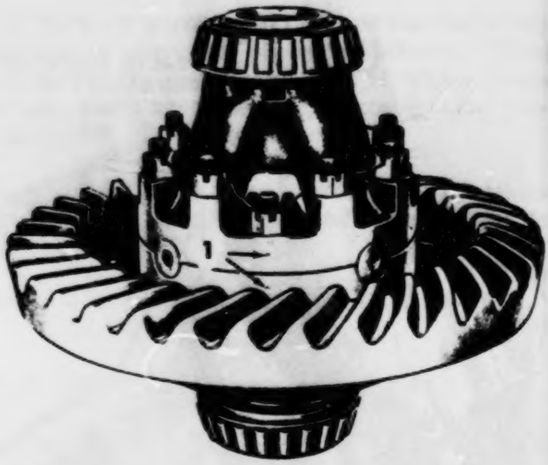


Figure 5-5. Marking Differential Case for Reassembly

w. Separate differential case tongue half (54) from differential case flange half (53). Take out differential bevel side gears (58), thrust washers (59), thrust washers (61), four differential pinion gears (60), and differential spider (62).

x. If ring gear (56) or differential case flange half (53) requires replacement, drill through heads of rivets (57) with 13/32-inch drill bit. Press out rivets (57) to separate ring gear (56) from differential case flange half (53). Do not attempt to chisel the heads off the rivets, as this will distort the mounting holes.

y. Using an arbor press (or other suitable press), press cones and rollers (52) off differential case tongue half (54) and differential case flange half (53), as shown in figure 5-6.

z. Remove key washer (3, figure 6-21) from end of bevel pinion (13). Remove and discard cork gasket (9) from circular groove in bevel pinion bearing cage (5).

aa. Using puller screws in holes provided, as shown in figure 5-7, remove pinion and cage assembly from right hand housing and tube assembly (50, figure 6-21). Remove and discard gasket (9) after cage removal.

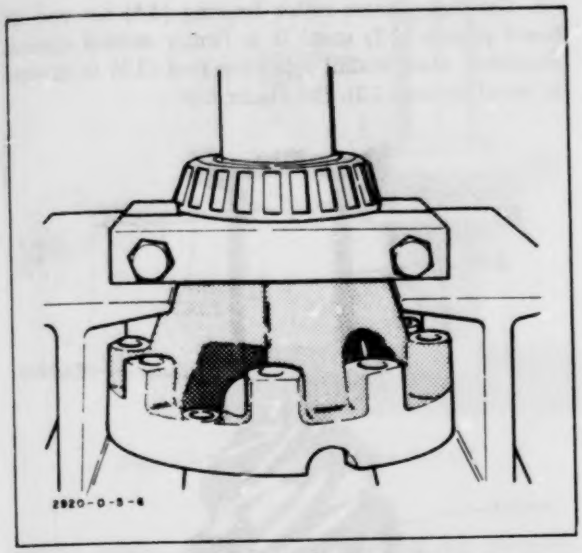


Figure 5-6. Differential Bearing Cone Removal

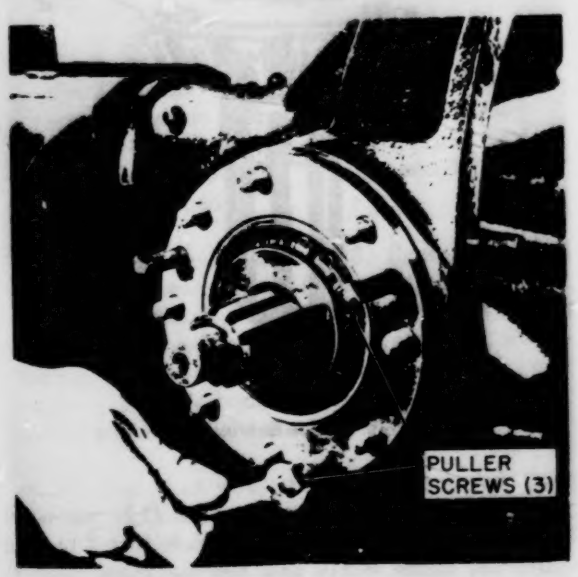


Figure 5-7. Pinion Bearing Cage Removal

ab. Remove cones and rollers (4), bearing cups (8), bearing shims (10), and bevel pinion (13) from bevel pinion bearing cage (5)

ac. Remove retaining ring (15) from end of bevel pinion (13). Press roller bearing (14) off bevel pinion (13). See figure 5-8.

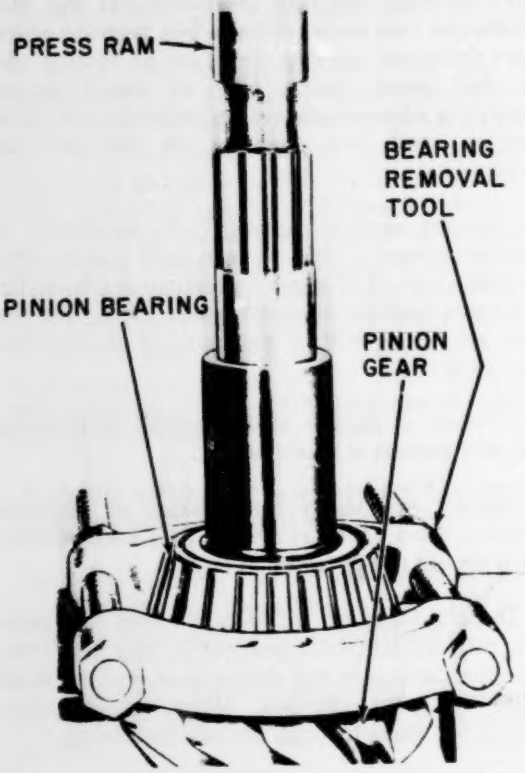


Figure 5-8. Pinion Bearing Removal

ad. Remove studs (7, figure 6-21) from right hand housing and tube assembly (50) only if replacement is required.

ae. Unscrew oil breather (17) and filler plug (47) from right hand housing and tube assembly (50).

5-37. CLEANING AND INSPECTION.

a. In addition to the general cleaning, inspection, repair and replacement procedures (paragraph 5-4 to 5-7), the following specific procedures should be followed.

b. Carefully remove all trace of gaskets and gasket cement to insure proper mating and sealing of component parts.

c. File or scrape nicks or burrs which may be present on bearing counterbores and bearing seating surfaces of axle shafts (34 and 35, figure

6-21), housing and tube assemblies (41 and 50), differential case halves (53 and 54), gearcase cover, input shaft, and housing, bevel pinion bearing cage (5), and bevel pinion (13) to assure proper reassembly of cones and rollers, bearing cups, roller bearings, and ball bearings in the required locations.

d. Do not clean oil seals (27) by immersion in cleaning solvent. Clean oil seals with a clean, dry, lint-free cloth. If required to remove stubborn dirt or foreign material deposits, use a clean, lint-free cloth moistened with a minimum of an approved cleaning solvent.

e. Discard all gaskets at disassembly and replace with new gaskets at reassembly.

f. Inspect axle shafts for evidence of torsional fractures. Also check runout at axle shaft splines, which should not exceed 0.005 in.

g. Inspect teeth on differential bevel side gears (58), differential pinion gears (60), ring gear (56), reduction drive gear and driven gear, and on bevel pinion (13) for chipped, pitted, galled, worn surfaces or breaks through the case hardening.

h. Inspect thrust washers (59 and 61) for wear and distortion. If replacement of thrust washers (59 and 61) is required, replace with a new set. Use of a combination of old and new thrust washers will result in premature failure.

i. If replacement of either ring gear (56) or bevel pinion (13) is required, a matched set consisting of both parts must be used to assure quiet and satisfactory operation.

5-38. REPAIR AND REASSEMBLY.

a. Repairs to the axle consist of replacement of detail parts found to be defective during the inspection procedure. Once all defective parts have been replaced, refer to figure 6-21 and proceed as follows:

b. Screw filler plug (47) and oil breather (17) into tapped holes in left hand housing and tube assembly (41). Replace any studs that have been removed from left hand housing and tube assembly (41).

c. Carefully press roller bearing (14) on end of bevel pinion (13) until it is firmly seated against shoulder, then install retaining ring (15) in groove in bevel pinion (13). See figure 5-9.

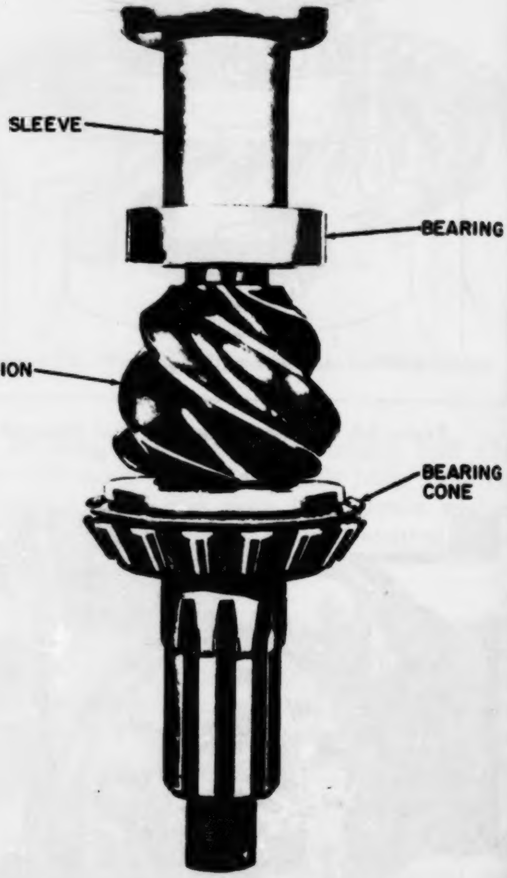


Figure 5-9. Pinion Bearing Installation

d. Install one cone and rollers (12) on bevel pinion (13), as shown in figure 5-9. Install bearing cups (8, figure 6-21) and bearing shims (10) in bevel pinion bearing cage (5). Place cork gasket in circular groove in bevel pinion bearing cage (5).

e. Mount pinion and bearing cage in arbor press as shown in figure 5-10.

f. While in press, at 25,000 pounds pressure, check bearing preload torque. Wrap soft wire around cage and pull on a horizontal line with a

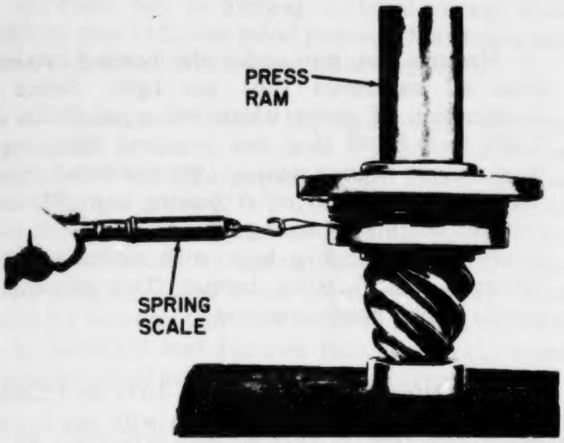


Figure 5-10. Checking Pinion Preload

spring scale. Spring scale reading to maintain pinion rotation should read 2 to 5 pounds.

Note

> If spring scale reading is not within specifications, use a thicker or thinner shim stack to adjust bearing preload. Installation of a thicker bearing shim stack will decrease preload, a thinner stack will increase preload.

g. Assemble bevel pinion (13, figure 6-21) and bevel pinion bearing cage (5) to left hand housing and tube assembly (41) with new gasket (9), and insert outer cone and rollers (4) into bevel pinion bearing cage (5). Place keywasher (2) on bevel pinion. Lubricate cones and rollers (4) and roller bearing (14) with light machine oil.

h. If ring gear (56) has been removed from differential case flange half (53), rivet ring gear (56) to differential case flange half (53) with 12 rivets (57). If either part is new, rivet holes may require line reaming before rivets can be inserted. Upset rivets (57) so that formed head is at least 1/8 inch larger in diameter than rivet holes. Formed heads must be approximately the same height as the preformed head. Avoid excess pressure which will cause distortion of rivet holes and result in gear eccentricity.

i. Press cones and rollers (52) onto hubs of differential case halves (53 and 54). Be sure that cones and rollers (52) are firmly seated against shoulders.

j. Lubricate all parts of the differential assembly (36) with a thin coat of axle lubricant.

k. Place one thrust washer (59) and one differential bevel side gear (58) in differential case flange half (53). Assemble four differential pinion gears (60) and thrust washers (61) on differential spider (62) and place in differential case flange half (53). Assemble remaining differential bevel side gear (58) and thrust washer (59) on differential spider (62). Align matchmark on differential case tongue half (54) with match mark on differential case flange half (53) (see figure 5-11). Assemble differential case tongue half (54, figure 6-21) to differential case flange half (53) with eight differential case bolts (55) tightened sequentially with 82 ft-lb torque.

l. Check differential assembly for free rotation. Lock wire heads of differential case bolts.

m. Press bearing cups (51) into recesses in housing and tube assemblies (41 and 50). Be sure that bearing cups (51) bottom in recesses.

n. Assemble thrust block (48) in left hand housing and tube assembly (41) with thrust block pin (49).

o. Insert a length of 1-1/4 inch diameter steel rod or pipe into right hand housing and tube assembly (50), then slide differential assembly onto pipe and

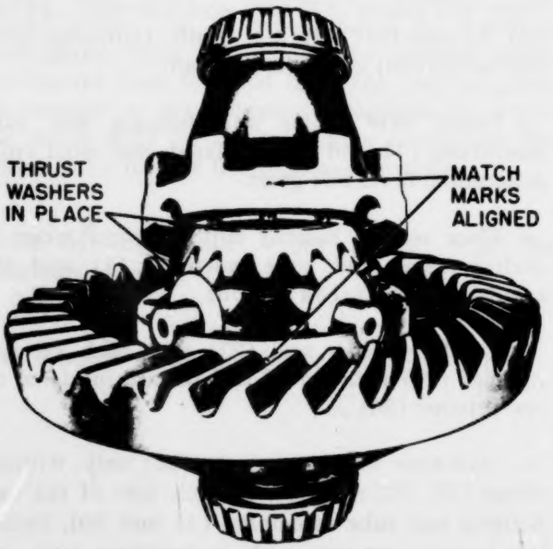


Figure 5-11. Assembling Differential

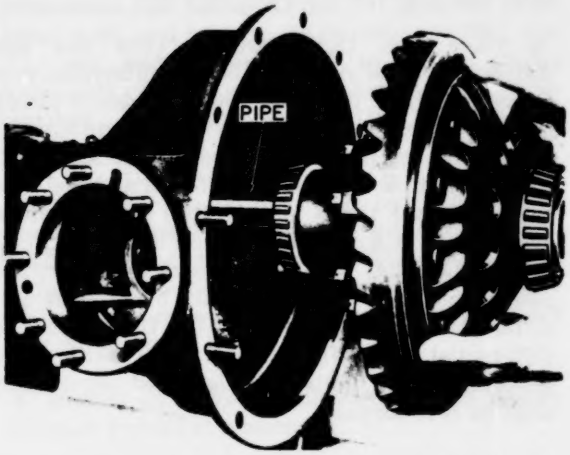


Figure 5-12. Installing Differential

into right hand housing and tube assembly. Assemble left hand housing and tube assembly (41) to right hand housing and tube assembly (50) using a new gasket (45). Secure parts together with 11 machine bolts (42), lock washers (44), and nuts (43) tightened evenly and sequentially to 47 to 52 ft-lb torque. Remove pipe. See figure 5-12.

p. Insert one bearing cup (32, figure 6-21) into each housing and tube assembly (41 and 50).

q. Carefully press one bearing collar (36) and two cones and rollers (33) onto each axle shaft (34 and 35). Be sure that parts seat firmly. Lubricate cones and rollers (33) with axle lubricant.

r. Insert axle shafts into housing and tube assemblies (41 and 50). Splined end must enter differential bevel side gears.

s. Place second bearing cup (32) into recess in each housing and tube assembly (41 and 50) around axle shafts (34 and 35).

t. Carefully press seal (27) into each oil seal retainer (24) with lip of seal toward inside of oil seal retainer (24).

u. Assemble bearing retainer (28) only, without shims (29, 30, and 31), to each side of the axle housing and tube assemblies (41 and 50). Secure the bearing retainer with lockwashers (26) and capscrews (25) tightened to 30 ft/lb torque.

v. Measure the gap under the bearing retainer after all capscrews (25) are tight. Select a combination of shims which will equal 0.003 to 0.005 inch LESS than the measured dimension. Now remove bearing retainer (28) and install shims (29, 30, 31) around outer bearing cup (32) and reinstall bearing retainer (28) and install oil seal retainer (24), securing both with capscrews (25) tightened to 30 ft/lbs torque. This procedure assures proper bearing preload.

w. Assemble brake assemblies (37) to housing and tube assemblies (41 and 50) with cap screws (38), lock washers (40), and nuts (39) tightened with 72 ft-lb torque (6 cap screws per brake assembly).

x. Slide rear wheel hubs (19), with wheel studs (23) installed, on ends of axle shafts. Secure rear wheel hubs (19) with flat washers (21) and castellated nuts (20) tightened securely. Insert cotter pins (22) through ends of axle shafts to secure castellated nuts (20).

y. Slide brakedrums (18) onto wheel studs (23) in rear wheel hubs (19).

z. Screw differential drain plug (46) into tapped hole in left hand housing and tube assembly (41).

aa. This completes assembly of the axle. For installation of gearcase assembly, refer to figure 6-20 and proceed as follows:

ab. Screw reduction gearcase drain plug (16) into tapped hole in bottom of gearcase housing (31).

ac. Place washer in seal retainer (13). Then press or drive oil seal (14) into seal retainer (13) with lip of oil seal (14) toward bottom of seal retainer (13) until it bottoms against washer. Press seal retainer (13) into bore of gearcase housing (31). Press from inside until rim of seal retainer (13) is flush with outer surface of gearcase housing (31).

ad. Slide gearcase housing (31) onto studs and over end of bevel pinion. Take care not to damage oil seal (14) on threads or keyway of bevel pinion. Secure gearcase housing (31) on studs with washers (33), and castellated nuts (32) tightened with 56 ft-lb torque. Secure castellated nuts (32) with lock wire through holes in studs.

ae. Place key in keyway in bevel pinion. Slide driven gear (12) into bevel pinion. Thread nuts and nut lock onto threaded end of bevel pinion.

af. Cones and rollers (12, figure 6-21) must be preloaded so that a torque of 5 to 15 in.-lb will be required to turn bevel pinion (13). This is equal to a tangential force of 1.1 to 3.3 pounds applied at the circumference of driven gear (12, figure 6-20). Vary preloading by tightening or loosening inner nut (1 figure 6-21). When testing preloading, outer nut (1) must be tightened securely against nut lock (2). Bend nut lock (2) over flats of nuts (1) when adjustment of preloading has been completed.

ag. Place ball bearing (17) on rear end of drive gear shaft (22) with retaining ring groove toward rear end of drive gear shaft (22). Secure to drive gear shaft (22) with retaining ring (18) inserted into groove in rear end of drive gear shaft (22). Place ball bearing (23) on front end of drive gear shaft (22).

ah. Assemble drive gear shaft (22) in gearcase housing (25).

ai. Assuring that dowels (15) are in place in gearcase housing, assemble gearcase cover (7) to gearcase housing (25) with new gasket (11). Secure gearcase cover (7) with 15 bolts (8), lock washers (10), and nuts (9). Tighten nuts with 30 ft-lb torque.

aj. Install retaining ring in groove in outer race of ball bearing (23).

ak. Press new oil seal (24) into gearcase housing (25) with lip of oil seal (24) toward inside of gearcase housing (25).

al. Assemble input shaft rear cap (2) and a new input shaft rear cap gasket (5) to gearcase cover (7) with four lock washers (4) and cap screws (3). Tighten with 30 ft-lb torque.

am. Screw filler plug (6) into tapped hole in gearcase cover (7). Screw oil breather (1) into tapped hole in input shaft rear cap (2).

an. Place yoke on drive gear shaft (22), using care not to damage oil seal (24). Secure yoke with flat washer (20) and lock nut (19).

5-39. INSTALLATION. See figure 6-19.

a. Position rear axle with assembled reduction gearcase under rear leaf springs and secure in place with eight locknuts as shown in figure 5-4.

b. Remove one nut, lock washer, and machine bolt from rear axle housing, and use these parts to assemble brake line tee fitting to rear axle assembly. (See figure 5-3.)

c. Remove plugs, untie brake line and connect brake lines to rear brake cylinders.

d. Reconnect propeller shaft to input shaft flange.

e. Mount rear wheels.

f. Fill reduction gearcase and rear axle with lubricant, of the type and grade recommended in the Lubrication Chart, figure 4-1.

g. Bleed brakes as outlined in paragraph 4-30.

5-40. BRAKES.

5-41. REMOVAL. Removal procedures for the complete brake assemblies are outlined in paragraph 5-36, steps h through k. However, most brake repairs can be accomplished by removing the brake drum to expose the internal parts, which are then removed from the backing plate. References in the following paragraphs are keyed to figure 6-22 for the rear brake assemblies. See figure 6-18 for the front brake assemblies.

5-42. DISASSEMBLY. (See figure 6-22 for exploded view).

a. Remove wheels and brake drums.

b. Remove retainer spring (1) from return spring (2) by prying off with a screwdriver.

c. Unhook and remove the return spring (2) from the brake shoes (6).

d. Depress the hold-down spring (4) and cup (3) until the end of the pin (5) can be grasped with a pair of needle-nose pliers. Turn the pin 90° until it can be disengaged from backing plate, and remove pin, spring, and spring cup.

e. Disengage brake shoes from wheel cylinder, and remove brake shoes (6).

f. Remove capscrews (9) and wheel cylinder assembly (8).

g. Remove boots (11) from ends of wheel cylinder.

h. Remove pistons (12), cups (13), and return spring (14) from cylinder body.

5-43. CLEANING AND INSPECTION.

a. Clean cylinder castings thoroughly with Stoddard type cleaning solvent.

b. After cleaning, hold the cylinder casting up to a strong light and sight through the cylinder bore. Any blemishes such as pitting, visible wear patterns, etc., will necessitate unit replacement.

c. A hone may be used to "clean-up" the cylinder, provided its use does not materially increase the size of the bore.

d. Cylinder diameter must not exceed the nominal dimension by more than 0.007 inch. This figure can be checked with a "GO-NO GO" type gage or by inserting a piston into the cylinder and checking clearance with a wire gage.

e. If mineral oil is present in the system, the rubber cups will be enlarged and very soft. These cannot be used and should be discarded.

f. Cylinder walls must be smooth and not pitted or scratched and be free from burrs. Remove light pits, scratches and burrs with a hone. If cylinder does not clean up with light honing, cylinder must be replaced.

g. Occasionally grease retainers become worn, allowing lubricant from wheel bearings to leak through in the brake drum. When grease comes into contact with the end closures, they become soft and enlarged, preventing them from protecting the cylinder from foreign matter. If this occurs, replace defective parts.

Note

> After a wheel cylinder is removed, it will be necessary to bleed brakes, as air will have entered the system with the wheel cylinder removed.

5-44. REPAIR AND REASSEMBLY.

a. Repairs consist of reconditioning the brake drums by turning on a lathe to remove scoring and true-up the lining contact surface, and the replacement of defective parts through the installation of repair kit parts and shoe and lining kits. Drums should not be turned to more than 0.060 in. oversize.

b. After repair or parts replacement, refer to figure 6-22 and reassemble brakes as follows:

c. Install wheel cylinder spring (14) cups (13), and pistons (12) into cylinder body (15). Install the rubber boots (11) over the end of the cylinder casting.

d. Install brake shoes (6) by inserting push rod end of shoe into wheel cylinder until it contacts the piston, then sliding shoe into position against eccentric adjusters.

e. Insert hold-down pins (5) thru shoe and backing plate. Install spring (4) and cup (3) over pin, and depress cup until pin can be turned 90° to lock parts into position.

f. Install U-shaped return spring (2) and secure with retainer spring (1).

g. Back off brake adjustment to allow clearance for lining installation.

h. Install brake drums and wheels, and connect brake lines to the wheel cylinder assemblies.

i. Bleed the brakes as outlined under paragraph 4-33.

j. Adjust lining clearance as outlined under paragraph 4-83.

5-45. ENGINE.

5-46. Most engine repairs will involve the accessories such as the carburetor, alternator, starting motor, etc. The removal and repair of these items is covered under separate headings within this section. If, however, a major repair or component failure within the basic engine has occurred, removal of the engine will be necessary in order to properly service the engine.

5-47. REMOVAL. The simplest method of engine removal requires that the engine and transmission be removed as a unit.

a. Drain the cooling system, transmission, and engine oil pan completely.

b. Disconnect the battery ground strap.

c. Remove the front and rear floorplates from the operators compartment.

d. Remove the engine compartment hood and both side panels.

e. Disconnect the transmission oil cooler lines, and upper and lower radiator hoses, at radiator. Disconnect wiring at the temperature sender on the lower radiator port. Remove radiator mounting screws and lift out radiator, providing additional clearance for engine removal.

f. Disconnect the propeller shaft from the companion flange on the transmission parking brake drum, by removing the bearing capscrews. Wire or tape the bearings that are disconnected to the universal joint journal spider, to prevent their accidental loss.

g. Remove the parking brake adjuster access plate and disconnect the swaged ball on the end of the cable from the parking brake operating lever. Loosen cable clamp and remove cable from parking brake. Disconnect shift control cable from transmission control levers, and unplug the neutral switch lead from the left side of the transmission case. Disconnect brake pedal return spring from cable anchor bracket.

h. Remove attaching hardware and separate the exhaust pipe flange from the exhaust manifold flange on the left side of the engine.

i. Disconnect fuel line at fuel pump on right side of engine. Tag and disconnect wiring at ignition coil.

j. Disconnect accelerator rod from bellcrank on firewall. Disconnect wiring to alternator.

k. Disconnect wiring from oil pressure sender and hourmeter switch. Disconnect ground strap from engine, and all wiring from starting motor.

l. Remove support bracket from steering column and firewall. Disconnect choke cable from carburetor linkage. Remove the four screws securing the firewall to the support angles, and swing firewall back towards the rear axle as far as possible.

m. Carefully check around the engine and remove all hose and wiring harness clamps that are fastened to the engine or transmission case.

n. Attach hoist to rear lifting eyes on cylinder head or arrange a sling around the engine in preparation for removal from the chassis. If a sling is used, make certain that it is arranged so that no damage will be caused to any of the engine components as the sling is tightened during lifting of the engine, and also that the sling will not slip, allowing the engine to fall.

o. Remove the two bolts securing the transmission support to the chassis crossmember as shown in figure 5-13.

p. Locate the two engine supports and remove the two hex nuts and capscrews securing each support to the brackets on either side of the frame.

q. Lift the engine and transmission assembly up and out of the chassis, guiding the assembly by hand to prevent striking the frame at any point. If resistance is felt, stop the hoist and check to see that all brackets, linkage, hose, and wiring have been disconnected before proceeding with removal.

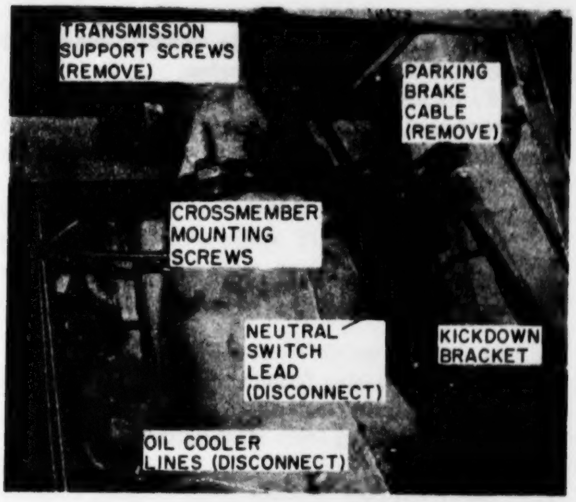

TRANSMISSION SUPPORT SCREWS (REMOVE)
PARKING BRAKE CABLE (REMOVE)
CROSSMEMBER MOUNTING SCREWS
NEUTRAL SWITCH LEAD (DISCONNECT)
KICKDOWN BRACKET
OIL COOLER LINES (DISCONNECT)

Figure 5-13. Transmission Mounting Points

5-48. INSTALLATION. To install the engine-transmission assembly into the chassis, proceed as follows.

a. Hoist the engine-transmission into place over the engine compartment of the vehicle.

b. Carefully lower the assembly, guiding the transmission through the hole in the firewall and towards the rear of the vehicle, until the transmission support insulator is in place over the frame crossmember as shown in figure 5-13.

c. Check to see that the engine supports are properly aligned with the frame brackets on each side of the engine compartment, and install mounting hardware and tighten securely.

d. Secure transmission support to crossmember as shown in figure 5-13. Connect the parking brake companion flange to the propeller shaft journal.

e. Connect the neutral start switch lead to the switch.

f. Hook brake pedal return spring end into hole in shift cable anchor bracket. Make certain shift control cable is properly engaged in the slot at the bottom of the anchor bracket, and connect the clevis end of the cable to the transmission control lever.

g. Position firewall against mounting angles and secure with four capscrews. Install steering column support bracket to column and firewall.

h. Connect the parking brake cable to the parking brake operating lever. Feed the swaged ball end of the cable through the cable guide and engage the ball into the slot in the operating lever (adjuster access plate must be removed from backing plate to connect cable to operating lever).

i. Connect ground strap from engine block to vehicle frame. Also connect tagged wiring to starter motor terminals, ignition coil, and oil pressure sender, and hourmeter switch.

j. Connect the exhaust pipe flange to the exhaust manifold, using a new gasket, and tighten hardware securely. Connect accelerator rod to the throttle bellcrank mounted on the firewall.

k. Connect the wiring to the alternator. Carefully observe the tagged markings on the wires to restore proper connections at the alternator terminals.

l. Install the radiator and connect oil cooler lines and the upper and lower radiator hoses. Tighten hose clamps securely to provide a leak-proof connection. Use new radiator hoses if the old hose is cracked or appears deteriorated in any way. Install wiring to water temperature sender.

m. Connect the fuel line to the fuel pump on the right side of the engine. Tighten hose clamps securely to prevent leakage.

n. Fill the cooling system, engine crankcase, and transmission, in accordance with the instructions of section IV.

o. Connect the battery ground strap and start the engine. Check coolant level, engine oil, and transmission fluid and add coolant or fluids as required to bring levels to specifications.

p. Check carefully around engine and transmission for signs of leakage and correct cause as required. Also attach and tighten any harness or hose clamps which may have been overlooked during the installation procedure.

q. Operate transmission in all gear ranges and check operation of parking brake, adjusting control cables as required.

r. Install hood, side panels, and operators compartment floorplates.

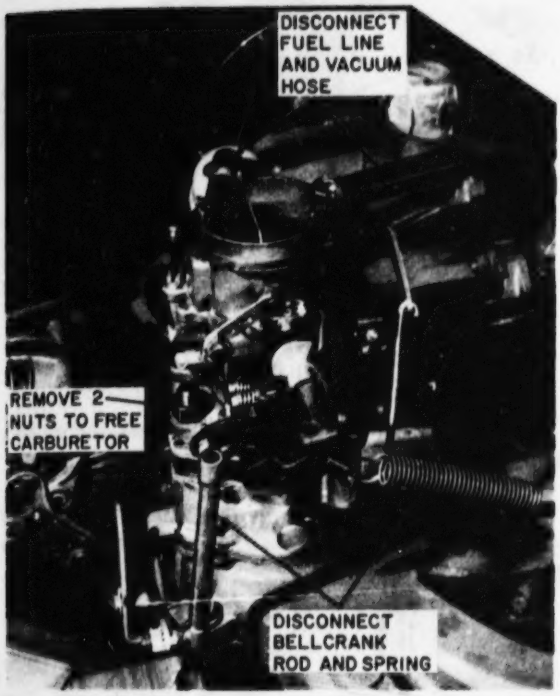

DISCONNECT FUEL LINE AND VACUUM HOSE
REMOVE 2 NUTS TO FREE CARBURETOR
DISCONNECT BELLCRANK ROD AND SPRING

Figure 5-14. Carburetor Mounting

5-49. CARBURETOR.

5-50. REMOVAL.

a. Disconnect crankcase ventilator hose from the air cleaner, loosen the air cleaner clamp, and remove the air cleaner.

b. Refer to figure 5-14, and disconnect distributor vacuum hose and fuel line from carburetor.

c. Unhook return spring and disconnect bellcrank rod as shown in figure 5-14.

d. Remove two nuts at the base of the carburetor, and remove the unit.

5-51. DISASSEMBLY. During disassembly of the carburetor, refer to figures 5-15 and 6-26 for parts identification of parts not called out on the disassembly photographs.

a. Place carburetor assembly on a repair stand.

b. Remove hairpin clip, and disengage accelerator pump rod, as shown in figure 5-16.

c. Remove two long and four short screws securing air horn.

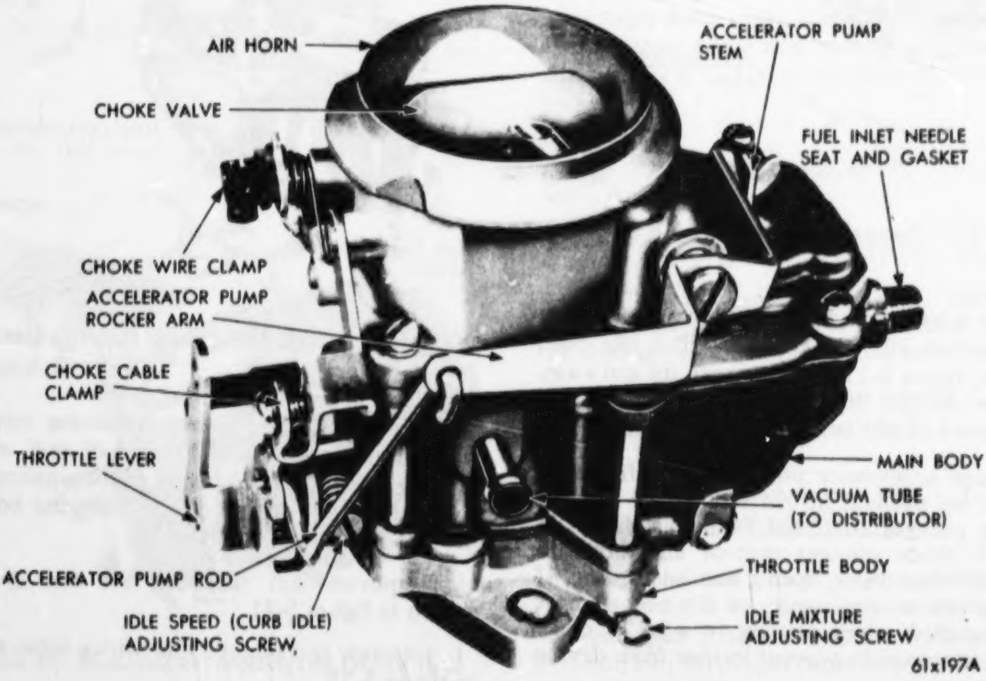

AIR HORN
CHOKE VALVE
CHOKE WIRE CLAMP
ACCELERATOR PUMP ROCKER ARM
CHOKE CABLE CLAMP
THROTTLE LEVER
ACCELERATOR PUMP ROD
IDLE SPEED (CURB IDLE) ADJUSTING SCREW
ACCELERATOR PUMP STEM
FUEL INLET NEEDLE SEAT AND GASKET
MAIN BODY
VACUUM TUBE (TO DISTRIBUTOR)
THROTTLE BODY
IDLE MIXTURE ADJUSTING SCREW
61x197A

Figure 5-15. Carburetor Assembly

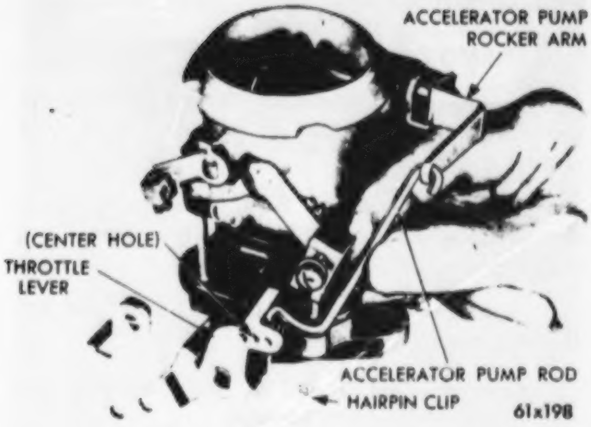

ACCELERATOR PUMP ROCKER ARM
(CENTER HOLE)
THROTTLE LEVER
ACCELERATOR PUMP ROD
HAIRPIN CLIP
61x198

Figure 5-16. Removing or Installing Accelerator Pump Rod

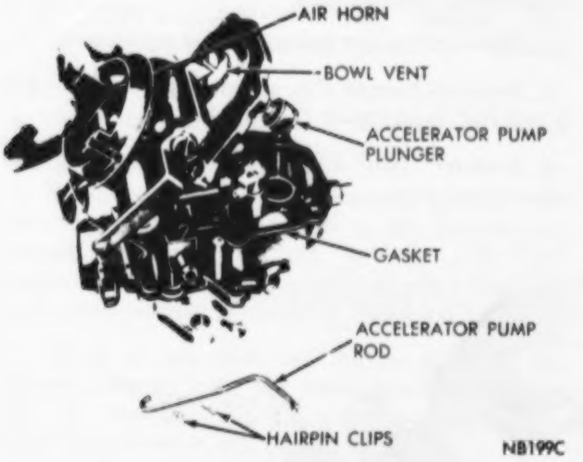

AIR HORN
BOWL VENT
ACCELERATOR PUMP PLUNGER
GASKET
ACCELERATOR PUMP ROD
HAIRPIN CLIPS
NB199C

Figure 5-17. Removing or Installing Air Horn

d. Tilt air horn toward throttle lever far enough to disengage fast idle cam link from fast idle cam, as shown in figure 5-17. Lift air horn up and away from main body. Separate main and throttle bodies. Discard all old gaskets.

e. Disengage accelerator pump plunger from the rocker arm by pushing up on bottom of plunger and sliding plunger shaft off hook, as shown in figure 5-18. Slide plunger out of air horn and remove bowl vent valve, spring seat and spring. If old plunger can be used again, or if a new plunger is to be installed, place plunger in a jar of clean gasoline or kerosene to prevent leather from drying out.

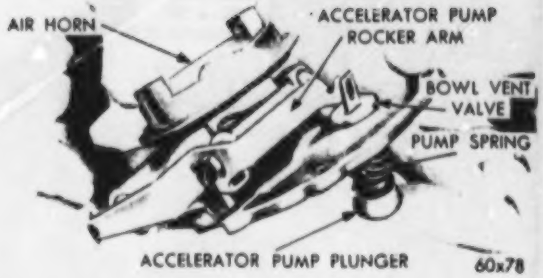

AIR HORN
ACCELERATOR PUMP ROCKER ARM
BOWL VENT VALVE
PUMP SPRING
ACCELERATOR PUMP PLUNGER
60x78

Figure 5-18. Removing or Installing Accelerator Pump Plunger

f. Remove fuel inlet needle valve, seat and gasket from main body.

g. Lift out float fulcrum pin retainer, then lift out the floats and fulcrum pin, as shown in figure 5-19.

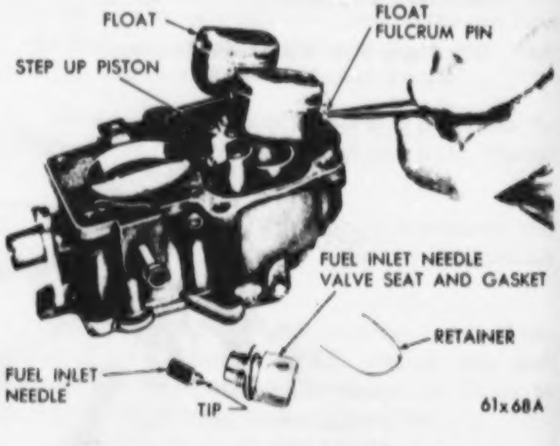

FLOAT
STEP UP PISTON
FLOAT FULCRUM PIN
FUEL INLET NEEDLE VALVE SEAT AND GASKET
RETAINER
FUEL INLET NEEDLE
TIP
61x68A

Figure 5-19. Removing or Installing Float

h. Remove step-up piston retaining screw, and slide step-up piston and rod out of well, as shown in figure 5-20. Now, lift out step-up piston spring. Remove step-up piston gasket from the bottom of the well.

i. Remove main metering jet and gasket, as shown in figure 5-21.

j. Unscrew and remove idle orifice tube, as shown in figure 5-22.

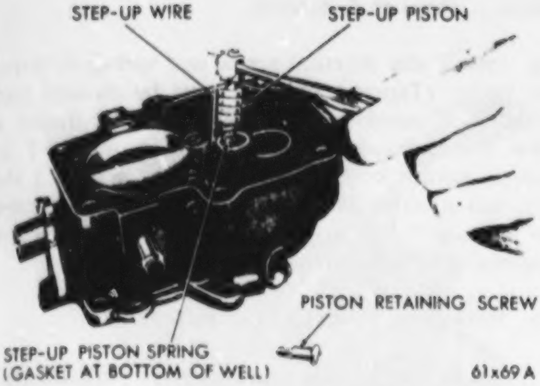

STEP-UP WIRE
STEP-UP PISTON
PISTON RETAINING SCREW
STEP-UP PISTON SPRING
(GASKET AT BOTTOM OF WELL)
61x69 A

Figure 5-20. Removing or Installing Step-up Piston

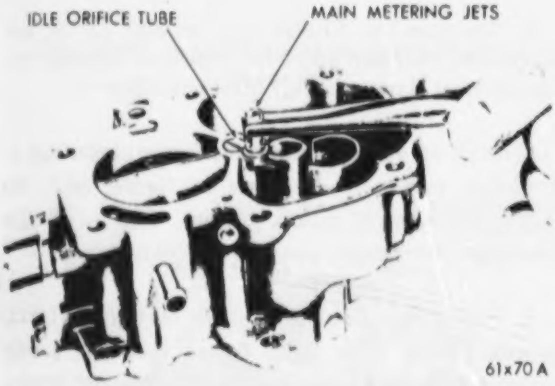

IDLE ORIFICE TUBE
MAIN METERING JETS
61x70 A

Figure 5-21. Removing or Installing Main Metering Jet

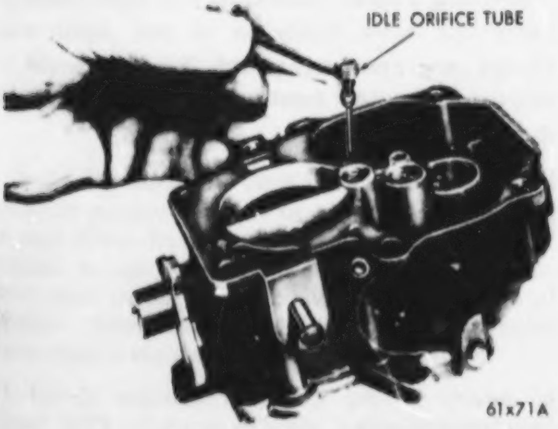

IDLE ORIFICE TUBE
61x71A

Figure 5-22. Removing or Installing Idle Orifice Tube

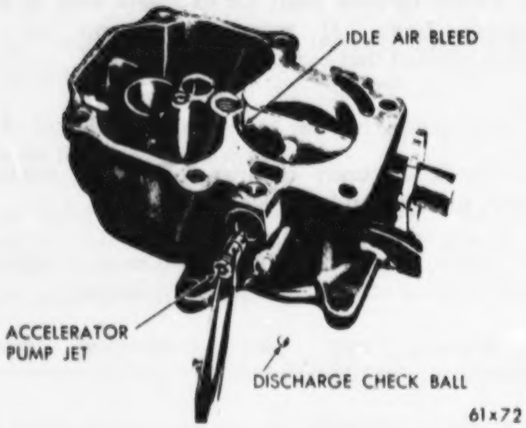

IDLE AIR BLEED
ACCELERATOR
PUMP JET
DISCHARGE CHECK BALL
61x72

Figure 5-23. Removing or Installing Accelerator Pump Jet

l. Remove accelerator pump jet plug and pull out the pump jet as shown in figure 5-23.

m. Examine repair kit on hand and to determine if idle mixture limiter cap is included before proceeding with this step. If cap is not in kit, do not remove present cap from idle mixture screw. If cap is in kit, remove present cap from idle mixture screw taking care not to bend, break or distort screw. Remove screw and spring noting the number of turns required to remove it.

n. The carburetor now has been disassembled into three main units, namely, air horn, main body and throttle body and component parts of each disassembled as far as necessary for cleaning and inspection.

o. It is not advisable to remove throttle shaft or valve from throttle body.

5-52. CLEANING, INSPECTION, AND REPAIR.

a. Refer to general cleaning instructions as outlined in paragraph 5-4. Denatured alcohol may be used in place of dry cleaning solvent.

b. After the solvent rinse, blow moisture out of all passages with compressed air.

CAUTION

Never clean jets or body passages with small drills or wire, as the orifices may be enlarged in this way, permitting a mixture too rich for proper carburetor performance.

c. Check throttle shaft for excessive wear in the throttle body. If wear is extreme, it is recommended that carburetor be replaced.

d: Check all body castings for cracks, warped gasket surfaces, and damaged threads.

e. Check linkage parts for bent arms or elongated pivot holes or any obvious physical damage.

f. Replace any part evidencing wear, deformation, or other defect.

5-53. REASSEMBLY. During reassembly, refer to figure 6-26 for parts identification, and proceed as follows:

a. During manufacture, location of the idle transfer port and the spark advance control ports to the throttle valve is carefully established for one particular assembly (see figure 5-24).

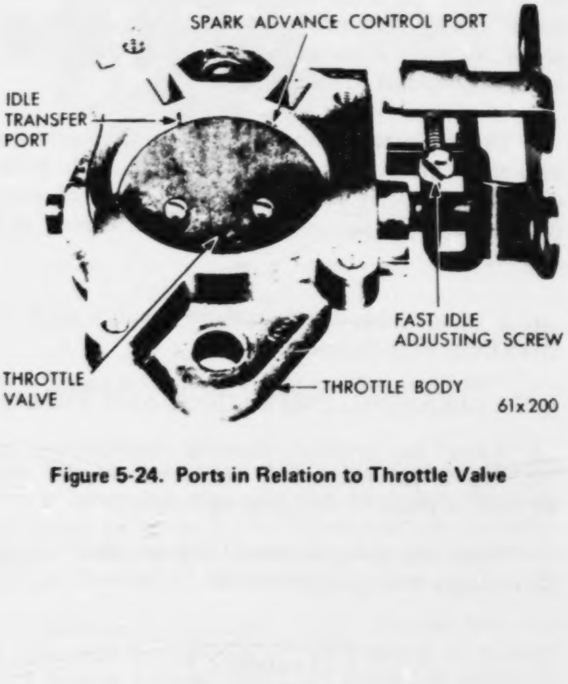


Figure 5-24. Ports in Relation to Throttle Valve

Steps b. through f. deleted.

g. Install idle mixture screw and spring in throttle body. (Tapered portion must be straight and smooth. If tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control.) Do not use a screwdriver. Turn screw lightly against its seat with fingers. Back off 1 full turn for approximate adjustment.

h. Install idle limiter cap as follows:

1. Soak cap in hot water to aid in installation.

2. Place cap on mixture screw head and press firmly using care not to turn mixture screw when forcing cap in place.

3. The tap on limiter cap should be in the maximum counterclockwise position against the limiter stop (base casting) after installation.

i. Install accelerator pump discharge check ball in discharge passage, as shown in figure 5-25. To check accelerator pump system, fuel inlet and discharge check balls, proceed as follows:

1. Pour clean gasoline into the carburetor bowl, approximately 1/2 inch deep. Remove pump plunger from jar of gasoline and flex leather several times to be sure it is soft and pliable and then slide down into the pump cylinder. Raise plunger and press lightly on the plunger shaft to expel air from the pump passage.

2. Using a small clean brass rod, hold discharge check ball down firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from either intake or discharge passage, as shown in figure 5-26.

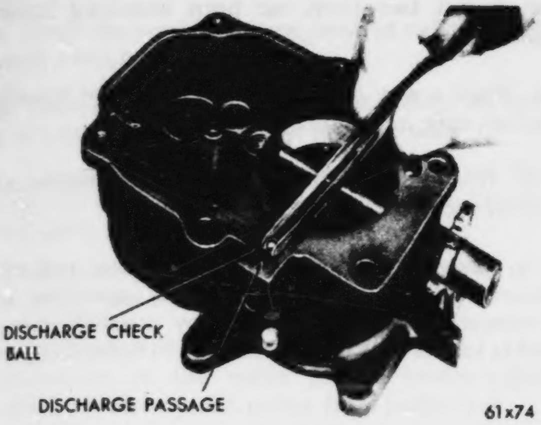

DISCHARGE CHECK BALL
DISCHARGE PASSAGE
61x74

Figure 5-25. Installing Accelerator Pump Discharge Check Ball

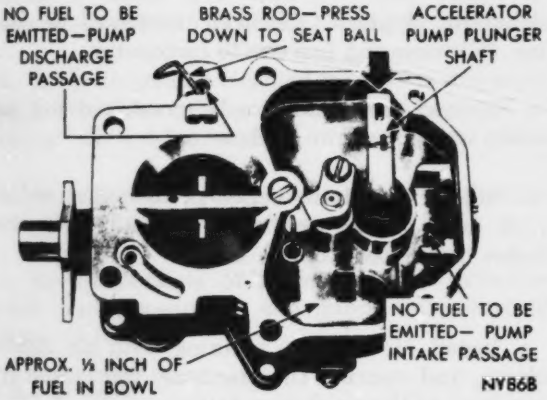

NO FUEL TO BE EMITTED—PUMP DISCHARGE PASSAGE
BRASS ROD—PRESS DOWN TO SEAT BALL
ACCELERATOR PUMP PLUNGER SHAFT
NO FUEL TO BE EMITTED— PUMP INTAKE PASSAGE
APPROX. ½ INCH OF FUEL IN BOWL
NY86B

Figure 5-26. Testing Accelerator Pump Intake and Discharge Check Ball

3. If any fuel does emit from either passage, it indicates presence of dirt or a damaged check ball or seat. Clean the passage again and repeat test. If leakage is still evident, install a NEW check ball. Fuel inlet check ball is located at the bottom of plunger well and should rattle freely when carburetor is shaken. Remove fuel from bowl.

j. Install accelerator pump jet, as shown in figure 5-23. Tighten securely, using removal tool shown. Install a new plug and drive tightly in place.

k. Install idle orifice tube (refer to figure 5-22). Tighten securely.

l. Install main metering jet and gasket (refer to figure 5-21). Tighten securely.

m. Before installing step-up piston, be sure step-up rod is able to move freely each side of the vertical position, as shown in figure 5-27. Step-up rod must be straight and smooth.

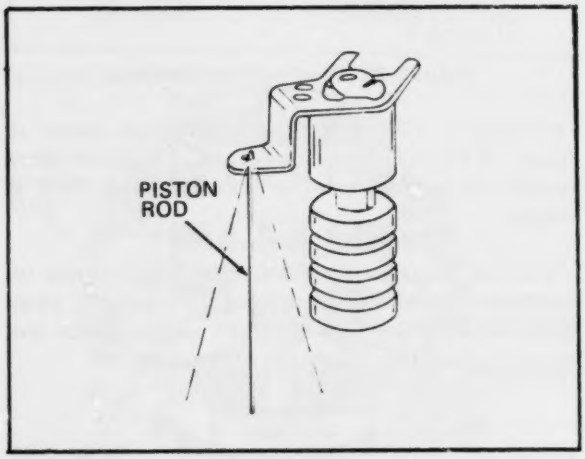


Figure 5-27. Step-Up Rod Free Play

n. Slide step-up piston gasket down into position in piston well, then install step-up piston spring and step-up piston and rod. Carefully guide the step-up rod into main metering jet. (Refer to figure 5-20.) Install retaining screw and tighten securely. Be sure step-up piston slides freely in its cylinder. A step-up piston stuck in UP position will cause a rich mixture at part throttle, whereas a piston stuck in the DOWN position will cause a lean mixture at wide open throttle and poor acceleration.

o. Install floats with the fulcrum pin and pin retainer in the main body.

p. Install needle, seat and gasket in body and tighten securely.

q. Invert main body so that the weight of floats only is forcing needle against seat. Hold finger against retainer to fully seat fulcrum pin.

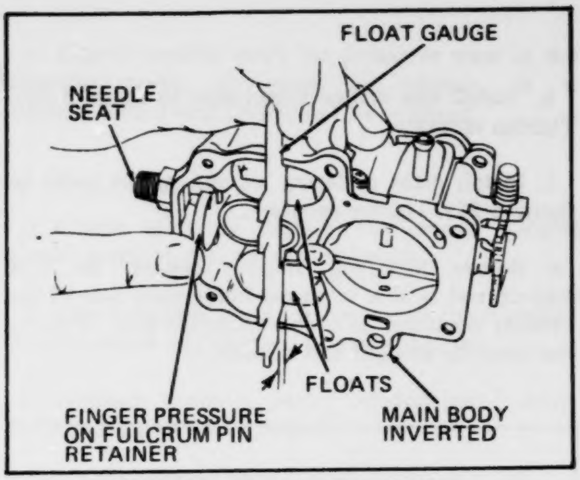


Figure 5-28. Checking Float Setting

r. Using a "T" scale, check float, as shown in figure 5-28. There should be 1/4 inch from surface of the fuel bowl to crown of each float at center.

s. If an adjustment is necessary, hold floats on bottom of bowl and bend float lip toward or away from needle. Recheck 1/4 inch setting again and repeat lip bending operation as required.

CAUTION

When bending float lip, do not allow the lip to push against the needle, as tip can be compressed sufficiently to cause a false setting which will affect correct level of fuel in bowl.

Note

After being compressed, tip is very slow to recover its original shape.

t. It is very important that float tip be perpendicular to needle, or slanted not more than 10 degrees away from the needle when float is correctly set.

u. Install hairpin clip in lowest of three notches in pump plunger stem. Assemble pump plunger, spring and spring seat, then slide assembly through opening in the air horn. Install bowl vent cap over plunger stem, then engage with pump rocker arm. (Refer to figure 5-18.)

v. Place a new gasket on main body, then install air horn by tilting air horn, as shown in figure 5-19, in order to engage fast idle link with fast idle cam. After engaging link, slowly lower air horn and at the same time guide accelerator plunger into its well, making sure that leather does not fold back or curl up.

w. Install two short air horn attaching screws loosely.

x. Place a new gasket between main and throttle bodies, then install four long screws.

y. When all parts are properly aligned, tighten all screws securely.

z. Install accelerator pump operating rod and secure with hairpin clip. (Normal operation of accelerator pump is obtained by installing pump rod in lowest hole of throttle arm.) (Refer to figure 5-16.)

5-54. INSTALLATION. After reassembly, refer to figure 5-14 and install carburetor as follows.

a. Place carburetor in position over intake manifold flange and governor assembly studs.

b. Install two hex nuts over studs to secure carburetor in place. Connect distributor vacuum line, PCV hose and fuel line to carburetor.

c. Connect the accelerator bellcrank rod and the return spring as shown in figure 5-14.

d. Adjust accelerator bellcrank to strike firewall 1/32 inch before carburetor throttle bellcrank strikes carburetor stop.

e. Install air cleaner, securing with air cleaner clamp, and connect the crankcase ventilation system hose to the air cleaner fitting.

f. Perform all carburetor adjustments as outlined in Section IV.

g. Install idle limiter cap as follows:

1. Soak cap in hot water to aid in installation.

2. Place cap on mixture screwhead and press firmly using care not to turn mixture screw when forcing cap in place.

3. The tab on limiter cap should be in the maximum counterclockwise position against the limiter stop (base casting) after installation.

5-55. WATER PUMP.

5-56. REMOVAL.

a. Drain the cooling system, both at radiator, and cylinder block drains.

b. Loosen water pump belt idler pulley, located at bottom front of the engine on right side.

c. Loosen fan belt by loosening screw in the alternator strap, and moving alternator in toward the engine.

d. Remove four screws securing fan, spacer, and fan pulley, and remove these parts.

e. Remove V-belts, and disconnect hose connections at the water pump. Remove four screws and water pump pulley from pulley hub.

f. Remove water pump retaining bolts, and remove water pump from the engine.

5-57. Deleted.

5-58. CLEANING, INSPECTION, AND REPAIR.

a. Refer to general cleaning instructions of paragraph 5-4. Use a wire brush where required to remove rust accumulations.

b. Inspect water pump assembly in accordance with general instructions of paragraph 5-5.

c. Repair consists of replacement of defective water pump assembly, and minor refinishing of gasket surfaces.

5-59. Deleted.

5-60. INSTALLATION.

a. Using a new gasket, install water pump on engine and tighten mounting bolts to 30 ft-lb torque.

b. Reconnect hoses and install cap on heater hose outlet. Install water pump pulley.

c. Install fan, fan spacer, and pulley, and fan and alternator/water pump drive belts.

d. Adjust belt tensions to provide 1/2 inch deflection when a force of 25 pounds is applied midway between the pulleys.

e. Check to see that drain cocks are closed and refill the cooling system with a solution of clean water and ethylene-glycol antifreeze.

f. Start the engine and check for leaks in cooling system. Add coolant as required.

5-61. ALTERNATOR (Chrysler)

a. The alternator (figure 5-31) has six (6) built-in silicon rectifiers that convert A.C. current into D.C. current. Current at the "output" terminal is D.C.

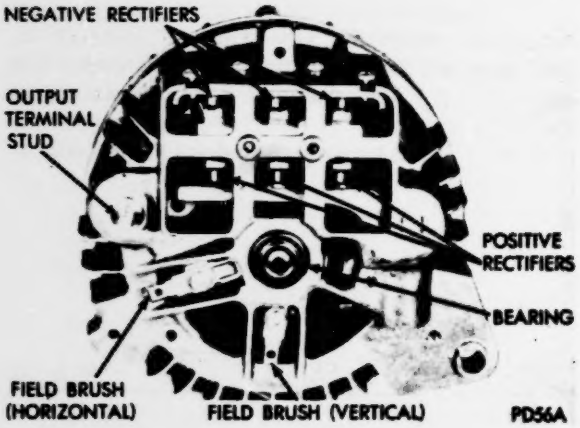


Figure 5-31. Alternator Assembly

b. The main components of the alternator are the rotor, stator, rectifiers, the end shields and the drive pulley.

c. Prior to removal of the alternator from the engine for repairs, a certain number of tests should be performed to help pinpoint the exact cause of the suspected malfunction. The results of these tests can be used in servicing a faulty unit. The storage battery must be in good condition and fully charged, prior to these tests.

5-62. CHARGING CIRCUIT RESISTANCE TEST. The charging circuit resistance test will show the amount of "voltage drop" between the alternator output terminal wire and battery. For the charging circuit resistance test:

a. Disconnect the battery ground cable.

b. Disconnect the "Bat" lead at the alternator output terminal.

c. Connect a 0-75 ampere scale D.C. ammeter in series between the alternator "Bat" terminal and the disconnected "Bat" lead wire (figure 5-32).

d. Connect the positive lead of a test voltmeter to the disconnected "Bat" lead wire. Connect the negative lead of the test voltmeter to battery positive post.

e. Disconnect the blue (Regulator) field lead wire from the alternator.

f. Connect a "jumper" lead from the alternator field terminal to ground.

g. Connect an engine tachometer and reconnect the battery ground cable.

h. Connect a variable carbon pile rheostat to the battery terminals. Be sure the carbon pile is in the "OPEN" or "OFF" position before connecting the leads.

i. Start and operate the engine at idle. Immediately after starting, reduce engine speed to idle.

j. Adjust the engine speed and carbon pile to maintain 20 amperes flowing in the circuit. Observe the voltmeter reading. The voltmeter reading should not exceed .7 volts. If a higher voltage drop is indicated, inspect, clean and tighten all connections in the charging circuit. A voltage drop test may be performed at each connection to locate the connection with excessive resistance. If the charging circuit resistance tested satisfactorily, reduce engine speed, turn off carbon pile and turn off ignition switch.

k. Disconnect battery ground cable.

l. Remove test ammeter, voltmeter and carbon pile.

m. Remove "jumper wire" between alternator field terminal and ground. Connect the blue field wire to the alternator field terminal.

n. Reconnect the battery ground cable.

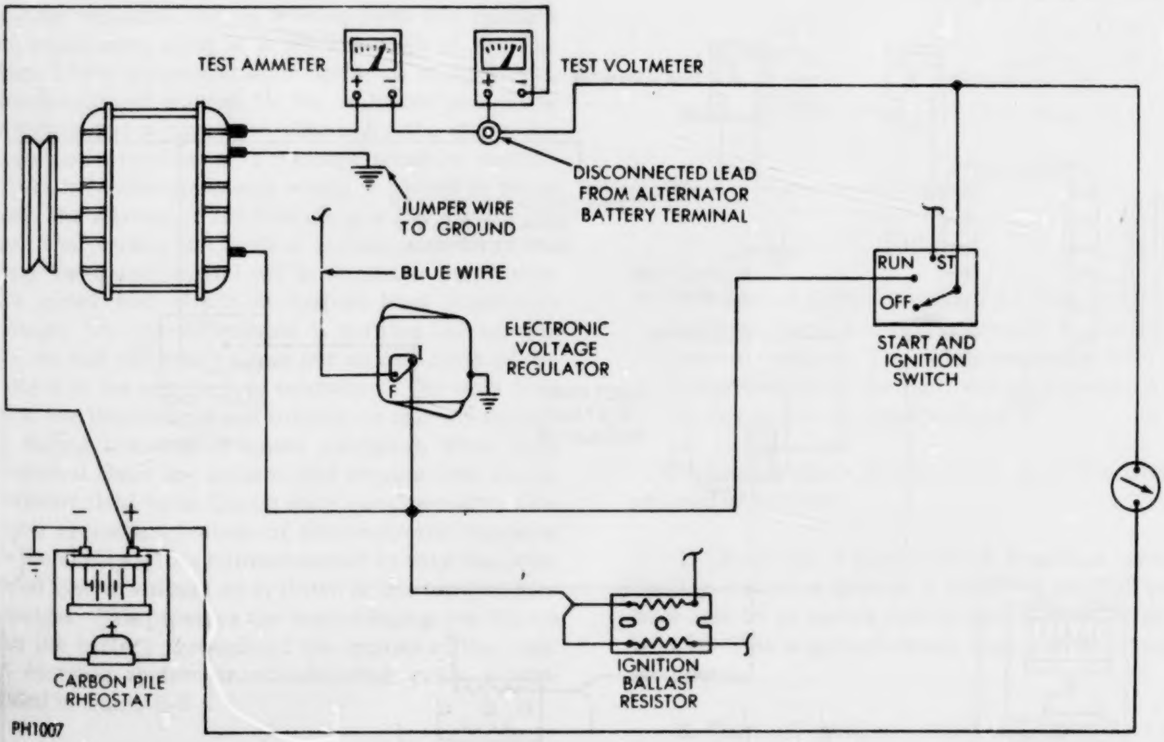

TEST AMMETER
+
−
TEST VOLTMETER
+
−
DISCONNECTED LEAD
FROM ALTERNATOR
BATTERY TERMINAL
JUMPER WIRE
TO GROUND
BLUE WIRE
RUN
ST
OFF
START AND
IGNITION
SWITCH
ELECTRONIC
VOLTAGE
REGULATOR
I
F
−
+
+
CARBON PILE
RHEOSTAT
IGNITION
BALLAST
RESISTOR
PH1007

Figure 5-32. Charging Circuit Resistance Test

5-63. CURRENT OUTPUT TEST. The current output test determines whether or not the alternator is capable of delivering its rated current output. See figure 5-33.

a. Disconnect the battery ground cable.

b. Disconnect the "batt" lead wire at the alternator output terminal.

c. Connect an ammeter (range 0-75 amps minimum) in series between the alternator "batt" terminal and the disconnected "batt" lead wire.

d. Connect the positive lead of a voltmeter (range 0-15 volts minimum) to the "batt" terminal of the alternator.

e. Connect the negative lead of the voltmeter to a good ground.

f. Disconnect the blue field wire (to voltage regulator) at the alternator.

g. Connect a "jumper wire" from the alternator field terminal to ground.

h. Connect an engine tachometer and reconnect the battery ground cable.

i. Connect a variable carbon pile rheostat between the battery terminals. (Be sure the carbon pile is in the "open" or "off" position before connecting leads.)

j. Start the engine and operate at idle. Immediately after starting, reduce engine speed to idle.

k. Adjust the carbon pile and engine speed in increments until a speed of 1250 rpm and voltmeter reading of 15 volts is obtained.

CAUTION

Do not allow voltage meter to read above 16 volts.

l. The ammeter reading must be within the limits shown in Table 5-2 for that size of alternator being tested.

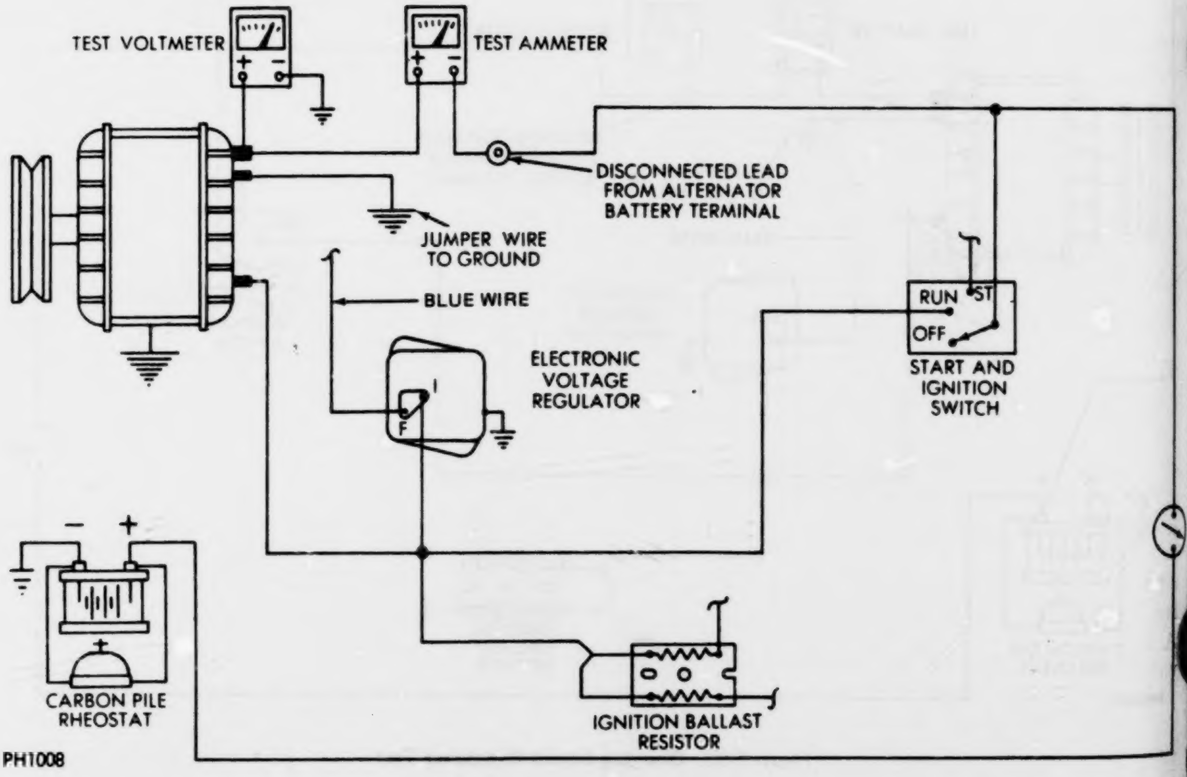

TEST VOLTMETER
TEST AMMETER
DISCONNECTED LEAD FROM ALTERNATOR BATTERY TERMINAL
JUMPER WIRE TO GROUND
BLUE WIRE
ELECTRONIC VOLTAGE REGULATOR
F
I
RUN
ST
OFF
START AND IGNITION SWITCH
CARBON PILE RHEOSTAT
IGNITION BALLAST RESISTOR
PH1008

Figure 5-33. Current Output Test

m. If the reading is less than specified, the alternator should be removed from vehicle and "bench tested."

n. After current output test is completed, reduce engine speed, turn off carbon pile and turn off ignition switch.

o. Disconnect battery ground cable.

p. Remove test ammeter, voltmeter and carbon pile.

q. Remove "jumper wire" between alternator field terminal and ground. Connect the blue field wire to the alternator field terminal.

r. Reconnect the battery ground cable.

5-64. VOLTAGE REGULATOR TEST (see figure 5-34). The electronic voltage regulator is a device that regulates the vehicle electrical system voltage by limiting the output voltage that is generated by the alternator. This is accomplished by controlling the amount of current that is allowed to pass through the alternator field winding. The electronic voltage regulator has no moving parts and requires no adjustment after it is set internally at the factory. There are several semiconductor components, transistors and diodes, in the regulator plus some resistors and a capacitor. Basically the electronic regulator operates as a voltage sensitive switch. There is a large transistor which is placed in series with the alternator field winding and a control circuit that senses the system voltage and turns the large transistor on and off as required. As alternator speed and electrical system load conditions change, the control circuit is turning the transistor on and off many times per second most of the time that the vehicle is in operation. The only time that the transistor is not turning on and off rapidly is during low engine speed operation when high electrical loads are present and require that the alternator field be in the on state continuously. One other important feature of the electronic regulator is the ability of its control circuit to vary the regulated system voltage up or down as the temperature changes. This provides the best charging conditions for the battery throughout the seasons of the year. A charging system troubleshooting guide is provided in Table 5-3

a. Clean the battery terminals and check the specific gravity. It should be above 1.200 to allow a properly regulated voltage check.

b. If the specific gravity is below 1.200, charge or use another battery and do not leave the uncharged battery in the circuit.

c. Connect the positive lead of the voltmeter to the terminal on the ballast resistor which has a blue wire or a blue and black wire connected to it.

Note

Do not disconnect connector from ballast resistor terminal.

d. Connect the negative lead from the voltmeter to a good vehicle body ground.

e. Start and operate engine at 1250 rpm with all lights and accessories turned off. Check voltmeter, the regulator is working properly if the voltage readings are in accordance with the following chart.

AMBIENT TEMPERATURE NEAR VOLTAGE REGULATOR	VOLTAGE RANGE
-20°F	14.9 to 15.9
80°F	13.9 to 14.6
140°F	13.3 to 13.9
Above 140°F	Less than 13.6

Note

It is normal for the ammeter to show an immediate charge and then gradually return to normal position. The duration the ammeter hand remains to the right will be dependent on the length of cranking time.

f. If the voltage is below limits or is fluctuating, proceed as follows:

1. Check for a good voltage regulator ground. Voltage regulator ground is obtained through regulator case to mounting screws and to sheet metal of vehicle. This is ground circuit that is to be checked for opens.

2. Turn off ignition switch and disconnect voltage regulator connector. Be sure terminals of connector have not spread open to cause an open or intermittant connection.

3. Do not start engine or distort terminals with voltmeter probe: turn on ignition switch, check for battery voltage at the wiring harness terminal. Both red and yellow leads should read battery voltage. Turn off ignition switch.

4. If the previous steps, 1 through 3 tested satisfactory, replace the regulator and repeat step e.

g. If the voltage is above the limits shown on the chart, proceed as follows:

1. Turn off the ignition switch and disconnect voltage regulator connector. Be sure terminals on the connector have not spread open.

2. Do not start engine or distort terminals with voltmeter probe: turn on ignition switch, check for battery voltage at the wiring harness terminal. Both red and yellow leads should read battery voltage. Turn off ignition switch.

3. If the previous steps, 1 and 2 tested satisfactory, replace the regulator and repeat step e.

h. Remove the test voltmeter.

5-65. ALTERNATOR SERVICE PROCEDURES. If alternator performance does not meet current output specifications limits, it will have to be removed and disassembled for further test and servicing.

a. Disconnect battery ground cable at battery negative terminal.

b. Disconnect alternator output "BAT" and field "FLD" leads and disconnect ground wire.

c. Remove alternator mounting bolts and remove alternator.

5-66. ROTOR FIELD COIL CURRENT DRAW TEST. If alternator field coil draw has not been tested on vehicle it may be tested on test bench as follows:

a. Connect a jumper wire between one field terminal of the alternator and the positive terminal of a fully charged battery. Connect test ammeter positive lead to the other field terminal of the alternator and the negative lead to the battery negative terminal.

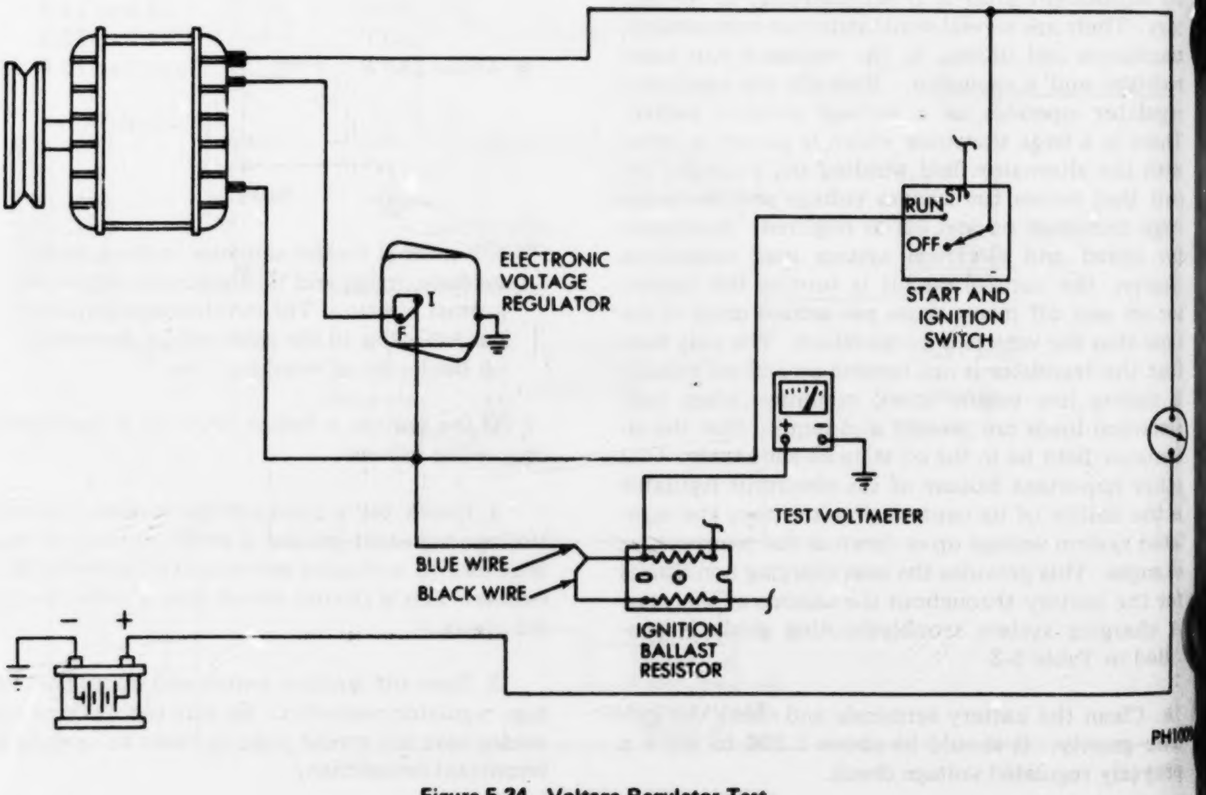


Figure 5-34. Voltage Regulator Test

b. Slowly rotate alternator rotor by hand. Observe ammeter reading. Field coil draw should be 2.5 amperes to 3.7 amperes at 12 volts. A low rotor coil draw is an indication of high resistance in field coil circuit, (brushes, slip rings, or rotor coil). A higher rotor coil draw indicates possible shorted rotor coil or grounded rotor.

c. No reading indicates an open rotor or defective brushes.

5-67. SEPARATING ALTERNATOR END SHIELDS. To prevent possible damage to brush assemblies, they should be removed before separating the end shields. The field brushes are mounted in plastic holders that position the brushes against the slip rings of the rotor.

a. Remove the brush screws, insulating washers and lift brush assemblies from end shield (figure 5-35).

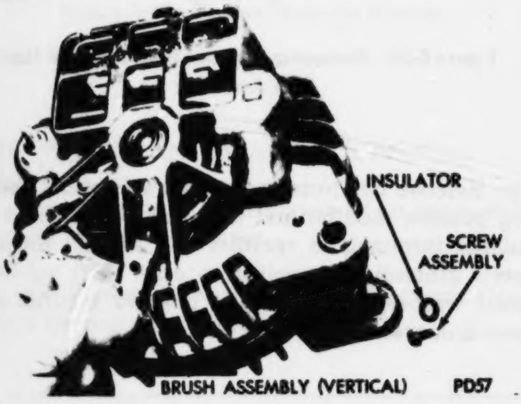

INSULATOR
SCREW ASSEMBLY
BRUSH ASSEMBLY (VERTICAL)
PD57

Figure 5-35. Removing Field Brushes

CAUTION

Stator is laminated, do not burr stator or, end shield.

b. Remove through bolts and pry between the stator and drive end shield with blade of a screwdriver (figure 5-36). Carefully separate drive end shield, pulley and rotor assembly away from stator and rectifier end shield assembly.

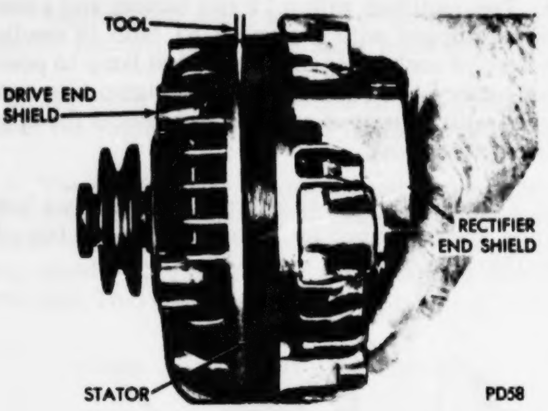

TOOL
DRIVE END SHIELD
RECTIFIER END SHIELD
STATOR
PD58

Figure 5-36. Separating Drive End Shield From Stator

5-68. TESTING RECTIFIERS.

a. Remove nuts from studs on terminal block securing stator windings, positive, and negative rectifier straps to block (figure 5-37).

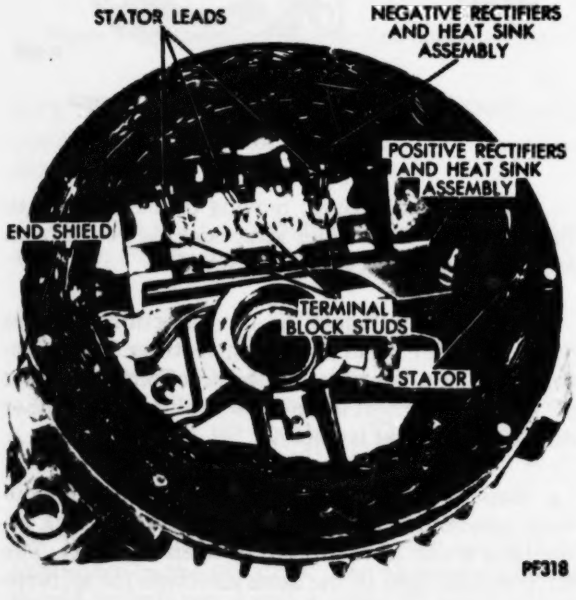

STATOR LEADS
NEGATIVE RECTIFIERS AND HEAT SINK ASSEMBLY
POSITIVE RECTIFIERS AND HEAT SINK ASSEMBLY
END SHIELD
TERMINAL BLOCK STUDS
STATOR
PF318

Figure 5-37. Rectifier End Shield and Stator Assembly

b. Lift off stator winding terminals and carefully pry stator assembly from end shield.

c. Test rectifiers with a 12 volt battery and a test lamp equipped with a number 67 bulb (4 candle power) by connecting one side of test lamp to positive battery post; other side of test lamp to a test probe with other test probe connected to the negative battery post.

d. Contact the heat sink of rectifier with one test probe and other test probe to strap on the top of rectifier (figure 5-38).

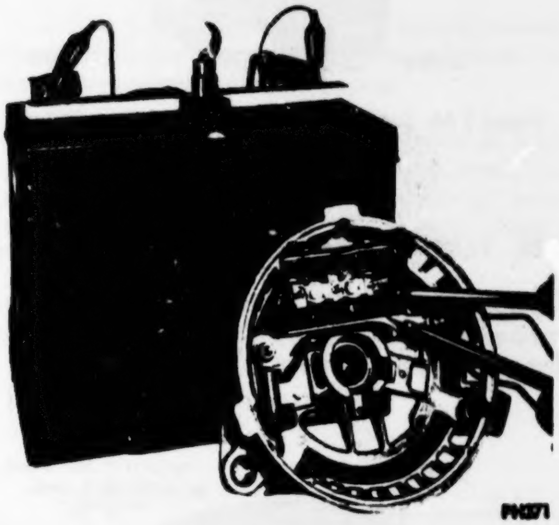


Figure 5-38. Testing Rectifiers with Test Lamp

e. Reverse the probes, moving probe from rectifier heat sink to rectifier strap and the probe from rectifier strap to rectifier heat sink.

f. If test lamp "lights" in one direction but does "not light" in other direction, rectifier is satisfactory. If lamp lights in "both directions," rectifier is "shorted." If test lamp does "not light" in either direction, rectifier is "open."

g. Repeat the above procedure for all rectifiers in both assemblies; change rectifier and heat sink assemblies which have shorted or open rectifiers. The lamp should light in the same direction for all rectifiers on each assembly.

5-69. RECTIFIER AND HEAT SINK ASSEMBLY REMOVAL.

a. Loosen four hexagon-head screws securing negative rectifier and heat sink assembly to rectifier end shield. Completely remove the two oute screws and lift assembly out of end shield (figur 5-39).

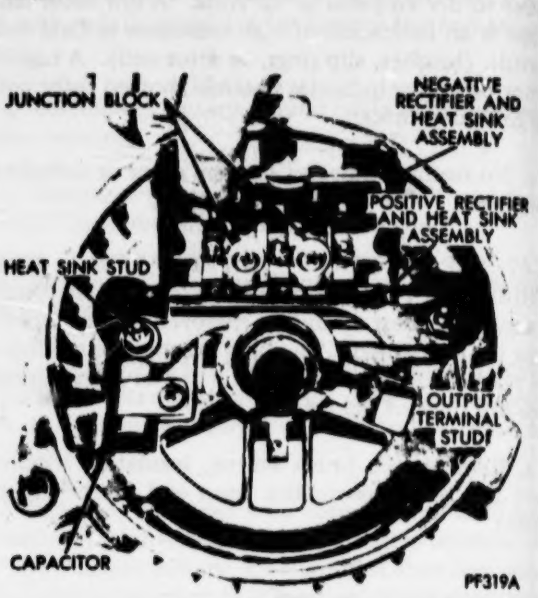

JUNCTION BLOCK
NEGATIVE RECTIFIER AND HEAT SINK ASSEMBLY
POSITIVE RECTIFIER AND HEAT SINK ASSEMBLY
HEAT SINK STUD
OUTPUT TERMINAL STUD
CAPACITOR
PF319A

Figure 5-39. Removing Negative Rectifiers and Heat Sink Assembly

b. Remove two nuts and washer assemblies, securing positive rectifier and heat sink assembly to insulated terminals in rectifier end shield. Remove screw grounding capacitor to case. Lift out insulated washer, capacitor and positive rectifier and heat sink assembly.

5-70. TESTING THE STATOR.

a. Press test probe firmly onto any pin on the stator frame. Be sure the varnish has been removed so that the pin is bare (figure 5-40).

b. Press test probe firmly to each of the three phase (stator) lead terminals one at a time. If the lamp lights, the stator lead is "grounded."

c. Press test probe firmly on one phase terminal lead and contact firmly each of the other two stator leads. Test lamp should light when prod contacts each of the terminals. If lamp does not light, stator winding is "open."

d. Install new stator if stator tested is "grounded" or "open."

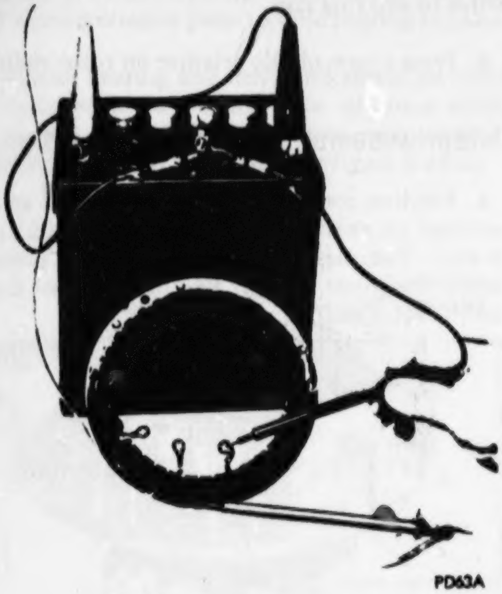


Figure 5-40. Testing Stator for Ground

5-71. PULLEY AND BEARING REMOVAL.

a. The pulley is an interference fit on rotor shaft. Remove pulley with puller.

b. Pry drive end bearing retainer from end shield with a screwdriver (figure 5-41).

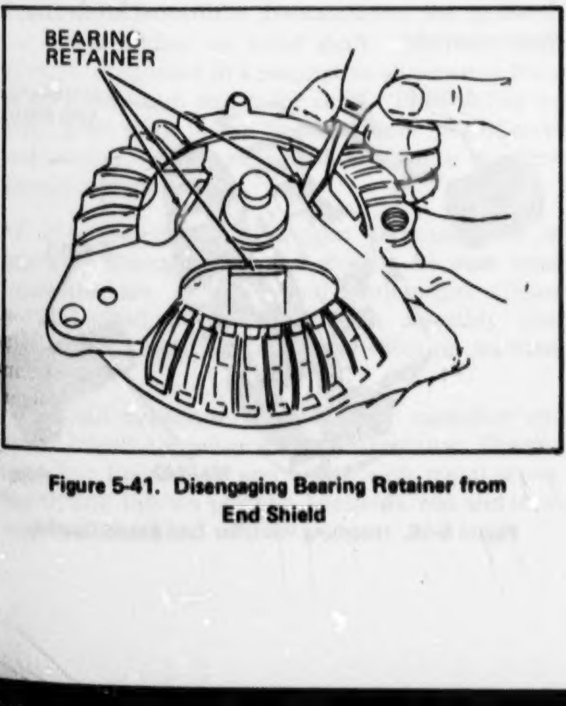


Figure 5-41. Disengaging Bearing Retainer from End Shield

c. Support end shield and tap rotor shaft with a plastic hammer to separate rotor from end shield.

d. The drive end ball bearing is an interference fit with the rotor shaft. Remove bearing with puller.

e. The needle roller bearing in rectifier end shield is a press fit. If necessary to remove rectifier end frame needle bearing, protect end shield by supporting shield with Tool C-3925 when pressing bearing out with Tool C-3770A (figure 5-42).

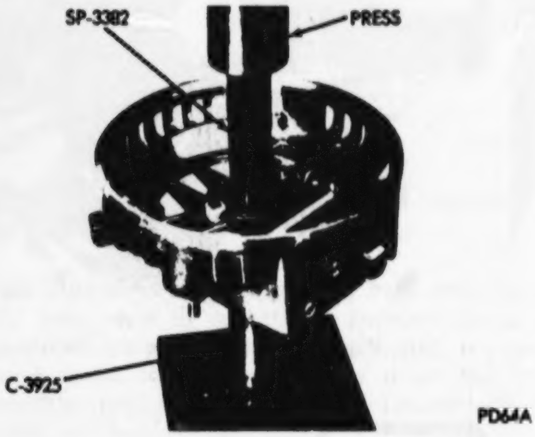


Figure 5-42. Removing Rectifier End Shield Bearing

5-72. ROTOR TEST. The rotor assembly may be checked electrically for grounded, open or shorted field coils (figure 5-43 and 5-44).

a. To check for a "grounded" field coil; connect an ohmmeter from each slip ring to the rotor shaft.

Note

> Ohmmeter should be set for "infinite" reading when probes are apart and zero when probes are shorted. The ohmmeter should read "infinite." If the reading is zero or higher, the rotor is gounded.

b. To check for an "open" field coil, connect an ohmmeter to the slip rings. The ohmmeter reading should be between 3 and 4 ohms on rotor coils at room ambient conditions. Resistance between 4 and 6 ohms would result from alternator rotors that have been operated on the vehicle at higher engine compartment temperatures. Readings above 6.5 ohms would indicate high resistance rotor coils and further testing or replacement may be required.

c. To check for a "shorted" field coil, connect an ohmmeter to the two slip rings. If the reading is below 3 ohms, the field coil is shorted.

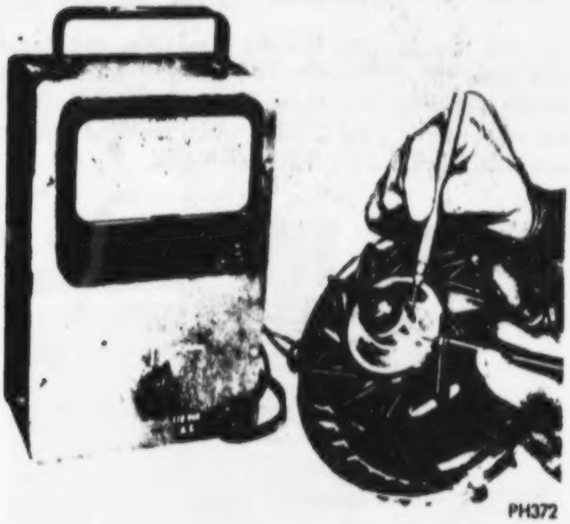


Figure 5-43. Rotor Test

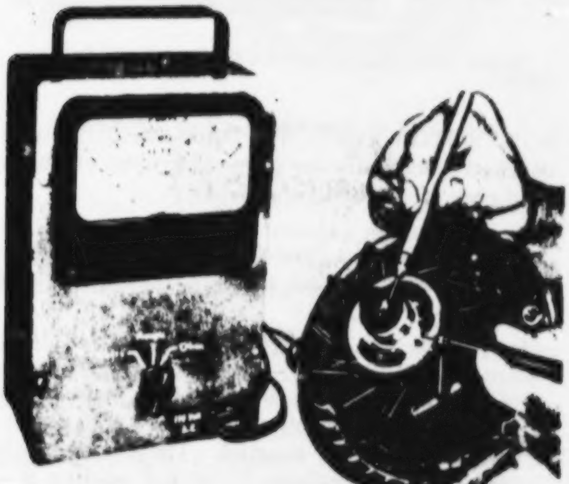


Figure 5-44. Rotor Test

5-72A. REPLACING SLIP RINGS.

a. Remove plastic retainer.

b. Unsolder wires from slip ring lugs and remove slip rings from rotor shaft.

c. Press new slip rings on rotor shaft and resold wires to slip ring lugs.

d. Press a new plastic retainer on rotor shaft.

5-72B. ASSEMBLING THE ALTERNATOR.

a. Position grease retainer on rotor shaft and pres retainer on shaft with installer Tool C-3921 (figure 5-45). The plastic retainer is properly positioned when the inner bore of the installer tool bottoms on the rotor shaft.

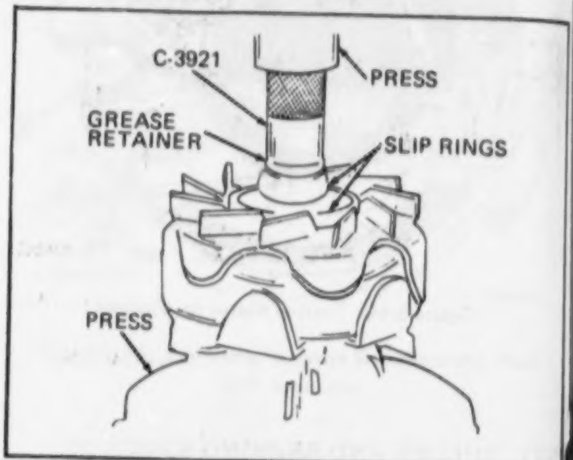


Figure 5-45. Installing Grease Retainer

b. Position rectifier end shield bearing on base of Tool C-4201. Place alternator end shield on top of bearing so that is is properly aligned. With top part of Tool C-4201 placed on end shield, press into place until it bottoms against it (figure 5-46). New bearings are prelubricated, additional lubrication is not required.

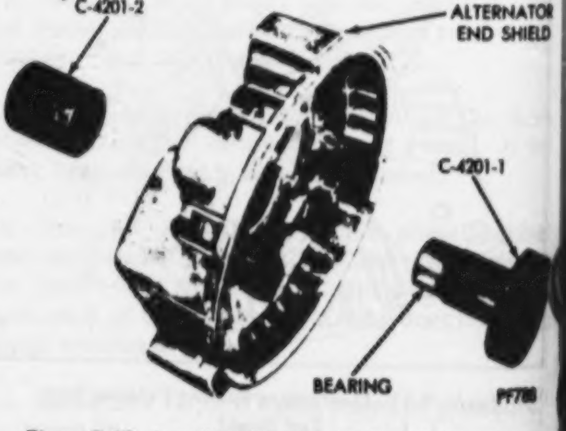


Figure 5-46. Installing Rectifier End Shield Bearing

c. Insert drive end bearing in drive end shield and install bearing retainer plate to hold bearing in place.

d. Position bearing and drive end shield on rotor shaft and, while supporting base of rotor shaft, press bearing end shield into position on rotor shaft with arbor press and Tool C-3858 (figure 5-46A).

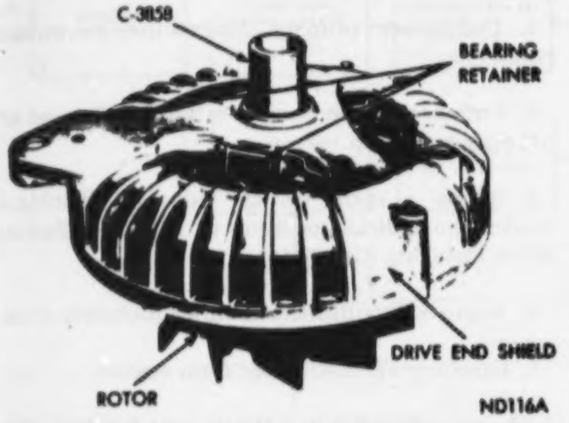

C-3858
BEARING RETAINER
DRIVE END SHIELD
ROTOR
ND116A

Figure 5-46A. Install Drive End Shield Bearing

CAUTION

Make sure bearing is installed squarely at installation; otherwise, damage to bearing will result. Press bearing on rotor shaft untill bearing contacts shoulder on rotor shaft fan hub.

e. Install pulley on rotor shaft. Shaft of rotor must be supported in a manner so all pressing force is on pulley hub and rotor shaft. Press pulley on rotor shaft until pulley contacts inner race of drive and bearing. Do not exceed 6800 pounds pressure. Do not hammer.

f. If removed, install output terminal stud in insulator through the end shield. Be sure mica insulators are in place and undamaged (figure 5-47). Install positive heat sink assembly over studs; guide rectifier straps over studs on terminal block.

g. Install capacitor terminal over capacitor end stud. Install capacitor shoulder insulator. Ground capacitor bracket to end shield with metal screw. Install and tighten positive heat sink nut and lockwasher assemblies.

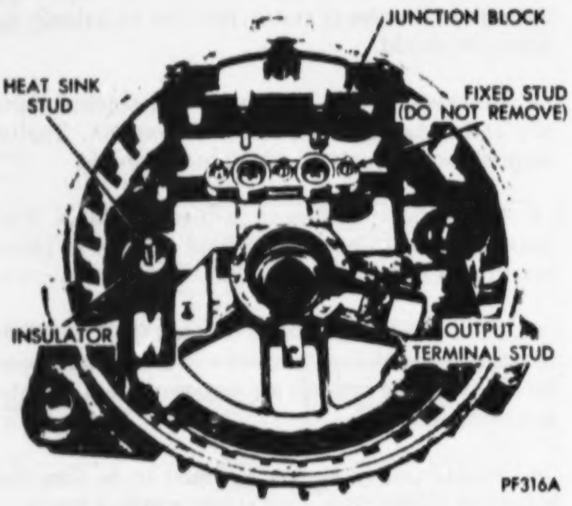

JUNCTION BLOCK
HEAT SINK STUD
FIXED STUD (DO NOT REMOVE)
INSULATOR
OUTPUT TERMINAL STUD
PF316A

Figure 5-47. Output Terminal Stud and Insulators Installed

h. Slide negative rectifier and heat sink assembly into place in end shield. Position straps on terminal junction block studs. Install hexagon-head metal screws through end shield and into negative heat sink and tighten securely (figure 5-48).

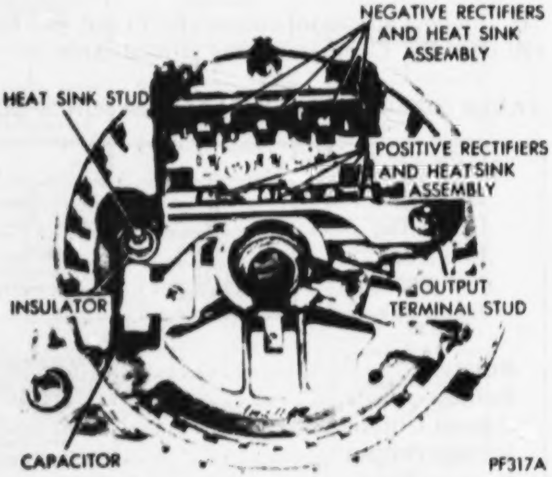

NEGATIVE RECTIFIERS AND HEAT SINK ASSEMBLY
HEAT SINK STUD
POSITIVE RECTIFIERS AND HEAT SINK ASSEMBLY
INSULATOR
OUTPUT TERMINAL STUD
CAPACITOR
PF317A

Figure 5-48. Capacitor and Insulator Installed

i. Position stator over rectifier end shield and install winding terminals on terminal block press stator pins into end shield and install and tighten winding terminal nuts. Route leads so that they cannot contact rotor or sharp edge of negative heat sink.

j. Position rotor and drive end shield assembly over stator and rectifier end shield assembly. Align through bolt holes in stator, rectifier end shield and drive end shield.

k. Compress stator and both end shields manually and install through bolts and washers. Tighten through bolts evenly to 40-60 inch-pounds.

l. Install field brushes in insulated holders. Position vertical and horizontal field brushes in proper location in rectifier end shield.

m. Place insulating washer on each field brush terminal and install lockwashers and attaching screws. Be sure that the brushes are not grounded. Tighten attaching screws.

n. Rotate pulley slowly by hand to be sure that rotor fan blades do not hit stator winding leads.

o. Install alternator and adjust drive belt to specifications.

CAUTION

Do not adjust drive belts with engine running.

p. Connect alternator output (BAT) and two field (FLD) leads. Connect battery ground cable.

q. Start and operate engine. Observe alternato operation.

r. Test current output.

5-73. DISTRIBUTOR.

5-74. REMOVAL.

a. Disconnect vacuum hose at distributor.

b. Disconnect primary lead wires at molded connector.

c. Unfasten distributor cap retaining clips and lift off distributor cap.

d. Scribe a mark on the edge of distributor housing to indicate position of rotor as referenc when installing distributor.

e. Remove distributor hold-down lockplate screw.

f. Carefully lift distributor from engine.

5-75. SHAFT AND BUSHING WEAR TEST. This test is used to determine condition of distributor shaft and housing bushings.

a. Remove distributor (refer to "Distributor Removal").

b. Remove distributor rotor.

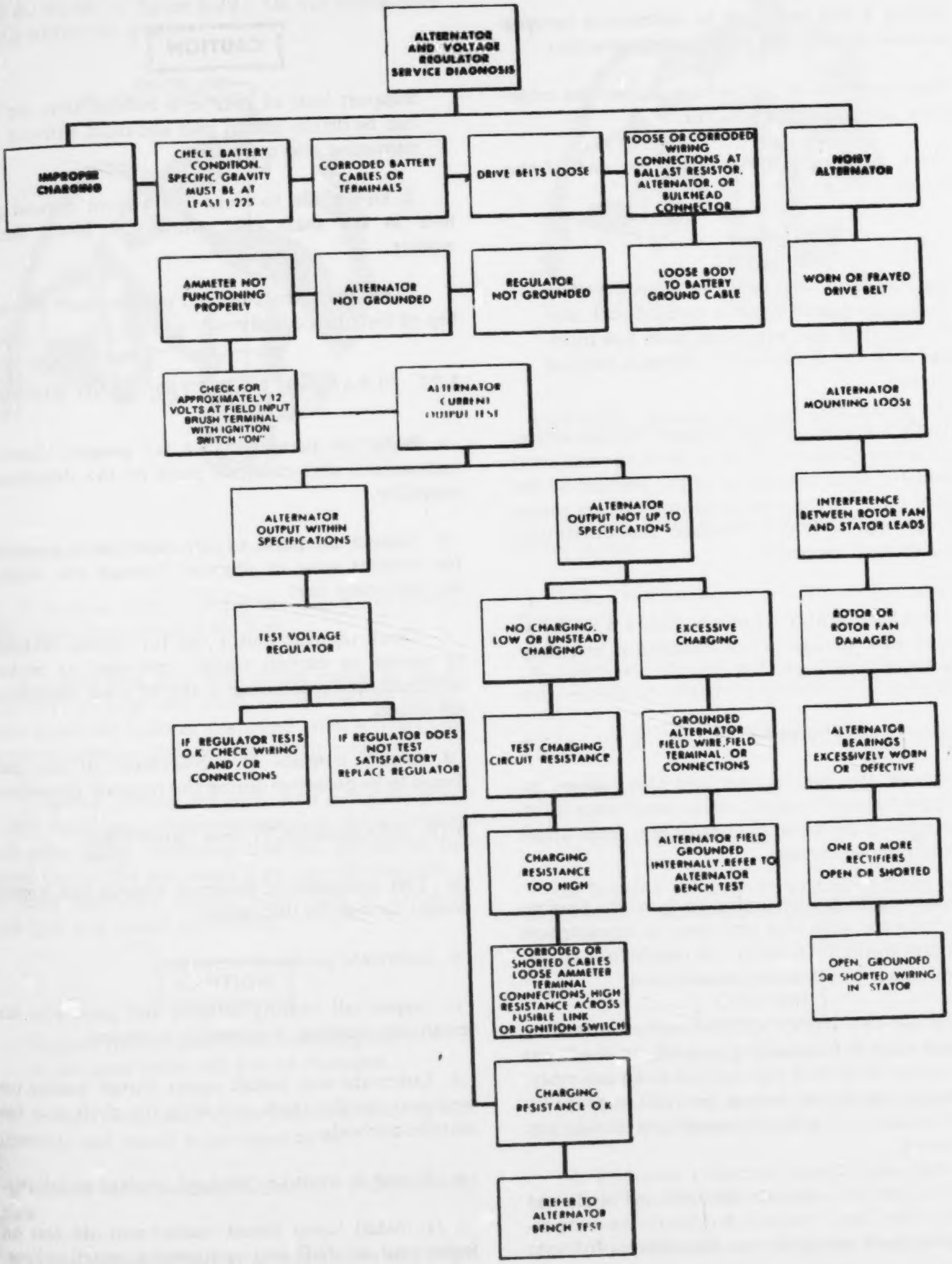
TABLE 5-2. CHRYSLER ALTERNATOR SPECIFICATIONS

Identification	Current Rating	Current Output
Red Tag	41 Amp.	40 Amp. Minimum
Green Tag	50 Amp.	47 Amp. Minimum
Blue Tag	60 Amp.	57 Amp. Minimum
Natural Tag	60 Amp.	57 Amp. Minimum
Black Tag	65 Amp.	62 Amp. Minimum
Rotation	Clockwise at Drive End	
Voltage	12 Volt System	
Current Output	Design Controlled	
Voltage Output	Limited by Voltage Regulator	
Brushes (Field)	2	
Condenser Capacity	50 Microfarad plus or minus 20%	
Field Current Draw Rotating by Hand	2.5 to 3.7 Amperes @ 12 Volts	

Current output is measured at 1250 engine rpm and 15 volts at the alternator. If measured at the battery, current output will be approximately 5 amperes lower than above value.

Voltage is controlled by variable load (carbon pile) across the battery.

TABLE 5-3. CHARGING SYSTEM TROUBLESHOOTING GUIDE


ALTERNATOR AND VOLTAGE REGULATOR SERVICE DIAGNOSIS
IMPROPER CHARGING
CHECK BATTERY CONDITION. SPECIFIC GRAVITY MUST BE AT LEAST 1.225
CORRODED BATTERY CABLES OR TERMINALS
DRIVE BELTS LOOSE
LOOSE OR CORRODED WIRING CONNECTIONS AT BALLAST RESISTOR, ALTERNATOR, OR BULKHEAD CONNECTOR
NOISY ALTERNATOR
AMMETER NOT FUNCTIONING PROPERLY
ALTERNATOR NOT GROUNDED
REGULATOR NOT GROUNDED
LOOSE BODY TO BATTERY GROUND CABLE
WORN OR FRAYED DRIVE BELT
CHECK FOR APPROXIMATELY 12 VOLTS AT FIELD INPUT BRUSH TERMINAL WITH IGNITION SWITCH "ON"
ALTERNATOR CURRENT OUTPUT TEST
ALTERNATOR MOUNTING LOOSE
ALTERNATOR OUTPUT WITHIN SPECIFICATIONS
ALTERNATOR OUTPUT NOT UP TO SPECIFICATIONS
INTERFERENCE BETWEEN ROTOR FAN AND STATOR LEADS
TEST VOLTAGE REGULATOR
NO CHARGING, LOW OR UNSTEADY CHARGING
EXCESSIVE CHARGING
ROTOR OR ROTOR FAN DAMAGED
IF REGULATOR TESTS O.K. CHECK WIRING AND/OR CONNECTIONS
IF REGULATOR DOES NOT TEST SATISFACTORY REPLACE REGULATOR
TEST CHARGING CIRCUIT RESISTANCE
GROUNDED ALTERNATOR FIELD WIRE,FIELD TERMINAL, OR CONNECTIONS
ALTERNATOR BEARINGS EXCESSIVELY WORN OR DEFECTIVE
CHARGING RESISTANCE TOO HIGH
ALTERNATOR FIELD GROUNDED INTERNALLY.REFER TO ALTERNATOR BENCH TEST
ONE OR MORE RECTIFIERS OPEN OR SHORTED
CORRODED OR SHORTED CABLES LOOSE AMMETER TERMINAL CONNECTIONS,HIGH RESISTANCE ACROSS FUSIBLE LINK OR IGNITION SWITCH
OPEN, GROUNDED OR SHORTED WIRING IN STATOR
CHARGING RESISTANCE O.K.
REFER TO ALTERNATOR BENCH TEST

c. Clamp distributor in a vise equipped with soft jaws and apply only enough pressure to resist any movement of the distributor during the test.

d. Attach a dial indicator to distributor housing so indicator plunger arm rests against reluctor.

e. Place one end of a wire loop around the reluctor sleeve just above the reluctor.

f. Hook a spring scale in the other end of the wire loop.

Note

The wire loop must be down against the top of the reluctor to insure a straight pull; also be sure that the wire loop does not interfere with the indicator or indicator-holding bracket.

g. Apply a one pound pull toward the dial indicator and a one pound pull away from the indicator and read the total movement of the plunger on the indicator dial. If the total indicator plunger movement exceeds .006 inch, replace the distributor housing or shaft assembly.

5-76. DISASSEMBLY. Refer to figure 6-29 for an exploded view illustration of distributor assembly, and proceed as follows:

a. Remove distributor rotor.

b. Remove the two screws and lockwashers attaching the vacuum control unit to distributor housing, disconnect the vacuum control arm from upper plate and remove control.

c. Remove reluctor by prying up from the bottom of the reluctor with two pry bars, or screwdrivers (maximum width 7/16 inch). Be careful not to distort or damage the teeth on the reluctor.

d. Remove two screws and lockwashers attaching the lower plate to the housing and lift out the lower plate, upper plate, and pick-up coil as an assembly. Distributor cap clamp springs are held in place by peened metal around the openings and should not be removed.

e. If the side play exceeds .006 inch in "Shaft and Bushing Wear Test," replace distributor housing assembly or shaft and governor assembly as follows:

1. Remove distributor drive gear retaining pin and slide gear off end of shaft. If gear is worn or damaged see paragraph 5-78, e.

CAUTION

Support hub of gear in a manner that pin can be driven out of gear and shaft without damaging gear teeth.

2. Use a file to clean burrs from around pin hole in the shaft and remove the lower thrust washer.

3. Push the shaft up and remove shaft through top of distributor body.

5-77. CLEANING, INSPECTION, AND REPAIR.

a. Refer to paragraph 5-4 for general cleaning instructions and clean all parts of the distributor assembly.

b. Inspect all parts of the distributor assembly for obvious wear or physical damage and replace any defective part.

c. Check the distributor cap for cracks, evidence of arcing or carbon tracks, corroded or broken terminals, and replace cap if any of these conditions are found.

d. Repair consists of replacement of any part found to be defective during the removal procedure.

5-78. REASSEMBLY. (See figure 6-29)

a. Test operation of governor weights and inspect weight springs for distortion.

b. Lubricate governor weights.

c. Inspect all bearing surfaces and pivot pins for roughness, binding or excessive looseness.

d. Lubricate and install upper thrust washer (or washers) on the shaft and slide the shaft into the distributor body.

e. If gear is worn or damaged, replace as follows:

1. Install lower thrust washer and old gear on lower end of shaft and temporarily install rollpin.

2. Scribe a line on the end of the shaft from center to edge, so line is centered between two gear teeth as shown in figure 5-49. Do not scribe completely across the shaft.

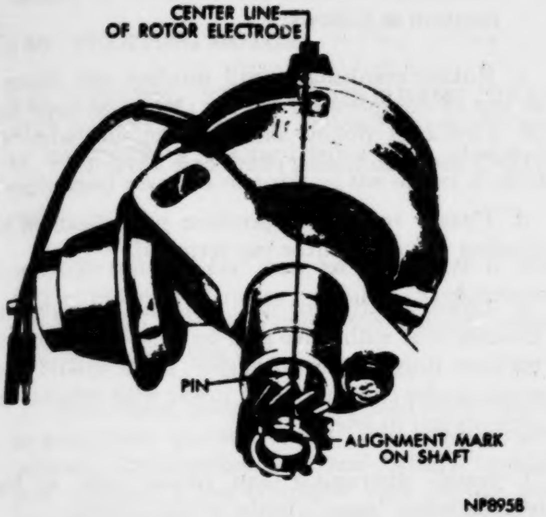

CENTER LINE OF ROTOR ELECTRODE
PIN
ALIGNMENT MARK ON SHAFT
NP8958

Figure 5-49. Scribe Line on Distributor Shaft

3. Remove rollpin and gear. Use a fine file to clean burrs from around pin hole.

4. Install new gear with thrust washer in place. Drill hole in gear and shaft approximately 90 degrees from old hole in shaft and with scribed line centered between the two gear teeth as shown.

5. Before drilling through shaft and gear, place a .007 feeler gauge between gear and thrust washer and after again observing that the centerline between two of the gear teeth is in line with centerline of rotor electrode (figure 5-50) drill a .124-129 inch hole and install the rollpin.

CAUTION

Support hub of gear when installing roll pin so that gear teeth will not be damaged.

f. Install lower plate, upper plate and pick-up coil ssembly and install attaching screws.

g. Attach vacuum advance unit arm to the pick-up plate.

h. Install vacuum unit attaching screws and washers.

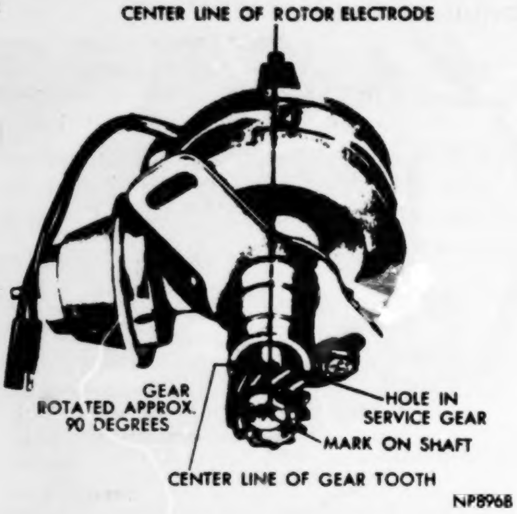

CENTER LINE OF ROTOR ELECTRODE
GEAR ROTATED APPROX. 90 DEGREES
HOLE IN SERVICE GEAR
MARK ON SHAFT
CENTER LINE OF GEAR TOOTH
NP8968

Figure 5-50. Aligning Gear Teeth with Centerline of Rotor Electrode

i. Position reluctor keeper pin into place on reluctor sleeve.

j. Slide reluctor down reluctor sleeve and press firmly into place.

k. Lubricate the felt pad in top of reluctor sleeve with one drop of light engine oil and install rotor.

5-78A. PICK-UP COIL REPLACEMENT.

a. Removal.

1. Remove distributor.

2. Remove reluctor by prying up from bottom with two pry bars or screw drivers (maximum width 7/16 inch).

CAUTION

Be careful not to damage reluctor teeth.

3. Remove two screws attaching vacuum control unit to distributor housing.

4. Disconnect vacuum control arm from upper plate and remove control unit.

5. Remove pick-up coil leads from distributor housing.

6. Remove two screws attaching lower plate to distributor housing.

7. Lift out lower plate, upper plate and pick up as as assembly from housing.

8. Remove upper plate and pick up coil assembly from lower plate by depressing retainer clip on underside of lower plate and moving it away from attaching stud.

Note

Pick-up coil is not removable from upper plate. They are serviced as an assembly.

b.Installation.

1. Place a small amount of distributor cam lubricant on upper plate support pins located on lower plate.

2. Position upper plate on lower plate, install retainer clip, depress and lock into place.

3. Position lower plate, upper plate and pick-up coil assembly in distributor housing, install mounting screws and tighten securely.

4. Attach vacuum control arm to upper plate, position control into place on distributor housing, install mounting screws and tighten securely.

5. Install pick-up coil leads to distributor housing.

6. Install reluctor. Refer to "Assembling the Distributor" for correct installation procedures.

7. Install distributor.

5-79. INSTALLATION.

a. Position distributor on the engine. Make certain rubber seal is in groove of distributor shank.

b. Engage distributor drive gear with camshaft drive gear so that when distributor is installed properly, rotor will be in line with previously scribed line on cylinder block.

Note

If engine has been cranked while distributor is removed, it will be necessary to establish proper relationship between distributor shaft and Number 1 piston position as follows:

c. Rotate crankshaft until number one piston i at top of compression stroke. (Mark on inner edg of crankshaft pulley should be in line with "0" (TDC) mark on timing chain case cover.)

d. Rotate rotor to a position just ahead of the number one distributor cap terminal.

e. Lower distributor into opening, engaging distributor gear with drive gear on camshaft. With distributor fully seated on engine, rotor should be directly under cap Number 1 tower with reluctor and pick-up coil in line.

f. Install distributor cap (make sure all high tension wires "snap" firmly in cap towers).

g. Install hold-down lock plate screw and tighten it finger tight.

h. Attach primary lead to coil.

Note

Do not connect distributor vacuum hose at this time.

i. Connect secondary lead of a Power Timing Light to Number 1 spark plug (using proper adapter) and red primary lead to positive terminal of battery and black primary lead to negative battery terminal.

j. Start engine and run at slow idle.

k. Rotate distributor housing so that timing mark on the crankshaft damper is aligned with 12° BTDC mark on the chain case cover. Refer to "Specifications." (Moving distributor housing counterclockwise advances timing and clockwise retards timing.)

l. Tighten distributor lock plate screw afte timing has been set and recheck timing adjustment with a Power Timing Light.

m. When timing is correct, connect vacuum hose to distributor.

n. Remove timing light from engine.

5-80. STARTING MOTOR.

5-81. TESTING STARTER CURRENT DRAW AND RESISTANCE. The following test will help to determine a starter defect and should be performed prior to removal of the starter from the engine.

a. Test battery for state of charge. If it tests 1.220 Specific Gravity or less (temperature corrected to 80°F), charge the battery before proceeding with this test.

b. Disconnect positive battery lead from battery terminal post. Connect an 0 to 300 scale ammeter between disconnected lead and battery terminal post. Connect a test voltmeter with .10 volt scale divisions between battery positive post and starter switch terminal at starter.

c. Crank engine and observe readings on voltmeter and ammeter. Voltage should not exceed .12 volt per 100 amperes of current. Current should not exceed 150 to 250 amperes (warm engine and battery).

d. A reading of voltage that exceeds .12 volt per 100 amperes indicates there is a high resistance caused from loose circuit connections, defective cable, burned switch contacts or, in some instances, a short in starter which causes a voltage leak. A current that is high and is combined with a slow cranking speed, indicates that starter should be removed and repaired.

5-82. REMOVAL.

a. Disconnect battery ground cable.

b. Disconnect starter cable as shown in figure 5-51.

c. Disconnect solenoid lead wire at terminal.

d. Remove the bolts and nuts securing the starter to the flywheel and ring gear housing, and remove the starter. Do not damage flywheel housing seal.

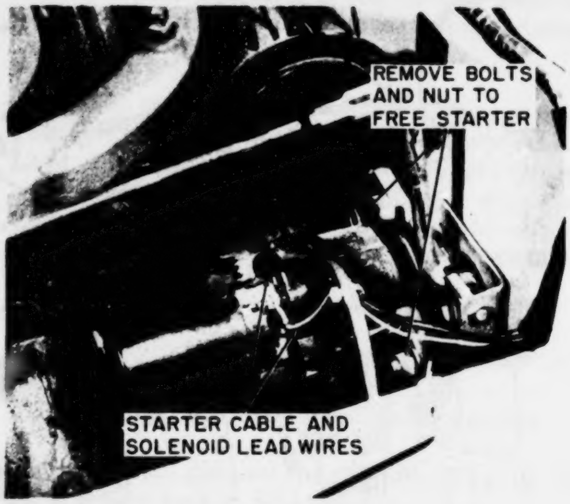

REMOVE BOLTS AND NUT TO FREE STARTER
STARTER CABLE AND SOLENOID LEAD WIRES

Figure 5-51. Starter Removal

5-83. BENCH TESTS.

a. Place starter in vise and connect a fully-charged 12 volt battery to starter as follows:

b. Connect a test ammeter (100 ampere scale) and carbon pile rheostat in series with battery positive post and starter terminal. Connect voltmeter (15 volt scale) across starter. Rotate carbon pile to full-resistance position. Connect battery cable from battery negative post to starter frame. Adjust rheostat until battery voltage shown on voltmeter reads 11 volts. The current draw should be 90 amperes maximum at 3700 rpm minimum.

c. Stall Test. Install starter motor in test bench. Follow instructions of test equipment manufacturer and check stall torque of starter against following specifications. With applied battery voltage adjusted to 4 volts, stall torque should be 8.5 ft-lb minimum, with a current draw of 475-550 amperes.

5-84. DISASSEMBLY (Refer to figure 5-52).

a. Remove through bolts and end head assembly.

b. Carefully remove armature from gear housing and field frame assembly, by pulling outwards.

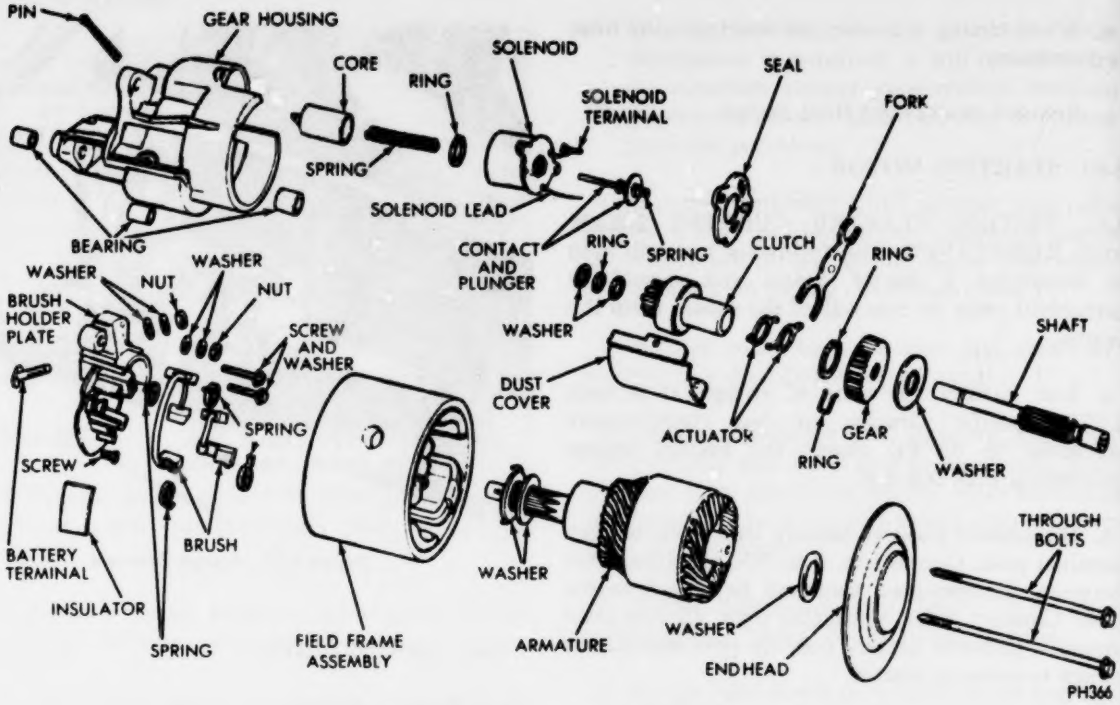

PIN
GEAR HOUSING
CORE
RING
SOLENOID
SEAL
SOLENOID TERMINAL
FORK
SPRING
SOLENOID LEAD
BEARING
CONTACT AND PLUNGER
RING
SPRING
CLUTCH
RING
WASHER
WASHER
NUT
NUT
BRUSH HOLDER PLATE
SCREW AND WASHER
WASHER
SHAFT
DUST COVER
SPRING
ACTUATOR
GEAR
RING
WASHER
SCREW
THROUGH BOLTS
BRUSH
BATTERY TERMINAL
WASHER
INSULATOR
WASHER
SPRING
FIELD FRAME ASSEMBLY
ARMATURE
ENDHEAD
PH366

Figure 5-52. Starter (Exploded View)

c. Carefully pull field frame assembly from gear housing far enough to expose terminal screw.

d. Remove terminal screw. It may be necessary to support terminal by placing finger behind it.

e. Remove field frame assembly.

f. Remove nut, steelwasher, and sealing washer from solenoid terminal.

g. Unwind solenoid lead wire from brush terminal.

h. Remove nuts attaching solenoid and brush holder plate assembly to gear housing.

i. Remove solenoid and brush plate assembly from gear housing.

j. Remove screws attaching solenoid to brush plate.

k. Remove solenoid from brush plate.

l. On brush plate, remove nut from battery terminal and remove terminal.

m. Remove solenoid contact and plunger assembly from solenoid.

n. Remove return spring from inside of solenoid moving core.

o. Remove dust cover from gear housing.

p. Release retainer clip that positions driven gear on pinion shaft.

CAUTION

Retainer is under tension and a cloth should be placed over the retainer to prevent it from springing away after removal.

q. Remove pinion shaft "C" clip.

r. Push pinion shaft towards rear of housing and remove retainer ring and thrust washers, clutch and pinion assembly, with the two shift fork nylon actuators as an assembly.

s. Remove driven gear and friction washer.

t. Pull shifting fork forward and remove solenoid moving core.

u. Remove shifting fork retainer pin and remove clutch shifting fork assembly.

5-85. CLEANING.

a. Do not immerse parts in cleaning solvent. Immersing field frame and coil assembly and/or armature will damage insulation. Wipe these parts with cloth only.

b. Do not immerse drive unit in cleaning solvent. The drive clutch is pre-lubricated at factory and solvent will wash lubrication from clutch. The drive unit may be cleaned with brush moistened with cleaning solvent and wiped dry with cloth.

c. Clean terminal contacts and contactor with crocus cloth.

d. Thoroughly clean outside area of brush plate to remove all oil and dirt.

5-86. INSPECTION AND REPAIR

5-86A. REPLACEMENT OF BRUSHES AND SPRINGS.

a. Brushes that are worn more than 1/2 the length of new brushes, or are oil-soaked, should be replaced.

b. When soldering the solenoid lead, make a strong low resistance connection using a high temperature solder and resin flux. Do not use acid or acid core solder.

c. Measure brush spring tension with a spring scale hooked under the spring near the end. Pull scale on a line parallel to the edge of brush and take a reading just as spring leaves brush. Spring tension should be 32 to 36 ounces. Replace springs that do not meet specifications.

5-86B. TESTING ARMATURE.

a. Place armature in growler and hold a thin steel blade parallel to the core and just above it, while slowly rotating armature in growler. A shorted armature will cause blade to vibrate and be attracted to the core. Replace armature if shorted.

b. Contact armature shaft and each of the commutator riser bars with a pair of test lamp test probes. If lamp lights, it indicates a grounded armature. Replace grounded armature.

c. Place armature in pair of "V" blocks and measure runout with dial indicator. Measure both shaft and commutator. A bent shaft requires replacement of armature. When commutator runout exceeds .004 inch, commutator should be refaced. Remove only a sufficient amount of metal to provide a smooth, even surface.

5-86C. TESTING FIELD COILS FOR GROUND.

a. Remove field frame assembly from starter.

b. Carefully drill out the rivet attaching the field coil ground leads to field frame.

c. Insulate field coil leads from field frame.

d. Test for ground using a 110 volt test lamp. Touch one probe of test lamp to field coil lead and other probe to field frame. Lamp should not light.

e. If lamp lights, it indicates that field coils are grounded and requrie replacement.

5-86D. SERVICING THE STARTER BUSHINGS.

a. Inspect armature shaft bearing, pinion shaft surfaces and bushings for wear. Try the bushings for wear by inserting the shafts and test for side play.

b. Pre-sized starting motor bushings are available as service bushings. Use Tool C-3944 to remove old bushings and install the new. No burnishing or reaming is required to fit pre-sized bushings.

c. The C-3944 Tool and its adaptors are designed to service all of the gear reduction motor bushings with the exception of the end head bushing. End head bushing and end head are serviced as an assembly.

5-86E. SERVICING THE STARTER CLUTCH UNIT.

a. Do not immerse starter clutch unit in a cleaning solvent. Starter clutch is prelubricated at the factory and a solvent will wash lubricant from the clutch.

b. The starter clutch outer housing and pinion gear may be cleaned with a cloth moistened with a cleaning solvent and wiped dry with a clean, dry cloth.

c. Rotate the pinion. Pinion gear should rotate smoothly in one direction (not necessarily easily), but should not rotate in opposite direction. If starter clutch unit does not function properly, or pinion is worn, chipped or burred, replace starter clutch unit.

5-87. ASSEMBLING THE STARTER. (See figure 5-52.)

a. The shifter fork consists of two spring steel plates assembled with two rivets. There should be approximately 1/16 inch side movement to insure proper pinion gear engagement. Lubricate between the plates sparingly with SAE 10 engine oil.

b. Position shifter fork in drive housing and install shifting fork retainer pin. One tip of pin should be straight, other tip should be bent at a 15 degree angle away from the housing. The fork and retainer pin should operate freely after bending tip of pin.

c. Install solenoid moving core and engage shifting fork.

d. Enter pinion shaft into drive housing and install friction washer and drive gear.

e. Install clutch and pinion assembly, thrust washer, retaining and thrust washer.

f. Complete installation of pinion shaft, engaging shifting fork with clutch actuators. The friction washer must be positioned on shoulder of splines of the pinion shaft before driven gear is positioned.

g. Install driven gear snap ring.

h. Install pinion shaft "C" clip.

i. Install starter solenoid return spring into bore of movable core.

j. Inspect condition of starter solenoid switch contacting washer, if top of washer is burned from arcing, disassemble contact switch plunger assembly and reverse the washer.

k. Install solenoid contact plunger assembly into solenoid. Make sure contact spring is positioned on the shaft of the solenoid contact plunger assembly.

l. Assemble battery terminal stud in brush holder.

m. Inspect condition of the contacts in brush holder plate. If contacts are badly burned, replace brush holder with brushes and contacts as an assembly.

n. Position seal on brush holder plate.

o. Enter solenoid lead wire through hole in brush holder and install solenoid stud, insulating washer, flat washer and nut.

p. Wrap solenoid lead wire tightly around brush terminal post and solder securely with a high temperature resin core solder and resin flux.

q Install brush holder to solenoid attaching screws.

r. Carefully enter solenoid coil and brush plate assembly into bore of gear housing and position brush plate assembly into starter gear housing and install housing attaching nuts. Tighten securely.

s. Position brushes with armature thrust washer. This will hold brushes out and facilitate proper installation of armature.

t. Install brush terminal screw.

u. Position field frame to the exact position on gear housing and enter armature into field frame and starter gear housing carefully engaging splines of shaft with reduction gear by rotating armature slightly to engage the splines.

v. Install thrust washer on armature shaft.

w. Position starter end head assembly and install through bolts. Tighten through bolts securely.

5-88. INSTALLING THE STARTER.

a. Before installing the starter, make sure starter and flywheel housing mounting surfaces are free of dirt and oil, to insure a good electrical contact.

b. Position starter to flywheel housing removable seal (if removed).

c. Install the starter, washer and bolt, and washer and nut. When tightening attaching bolt and nut, be sure to hold the starter pulled away from the engine to insure proper alignment.

d. Attach wire at solenoid switch terminal, and cable to starter terminal.

e. Connect battery ground cable and test operation of the starter for proper engine cranking.

5-89. MANIFOLDS.

5-90. REMOVAL AND DISASSEMBLY.

a. Refer to figure 6-31 and proceed as follows:

b. Remove air cleaner.

c. Remove vacuum control tube at carburetor and distributor.

d. Remove fuel line and remove carburetor.

e. Disconnect the exhaust pipe.

f. Remove nuts and conical washers holding intake and exhaust manifolds to the cylinder head.

g. Remove the assembly from the cylinder head.

h. Remove three bolts holding intake manifold to exhaust manifold.

i. Separate the manifolds and discard gasket.

5-91. CLEANING AND INSPECTION.

a. Clean the manifolds in solvent and dry with compressed air.

b. Check the mating surfaces of manifolds with a straightedge. The gasket surfaces should be flat within .008 inch.

c. Inspect manifolds for cracks or distortion.

d. Check action of the heat control valve, which must be free to move against spring tension.

e. Replace heat control valve parts if action is sticky or bound up.

5-92. REASSEMBLY AND INSTALLATION.

a. Install a new gasket between the exhaust and intake manifolds, install the two long outboard screws and inboard stud and nut holding the manifolds together.

CAUTION

Do not tighten these two screws and nut at this time. When installing the manifolds on the cylinder head of the engine, it is very important that the exhaust manifold be permitted to expand and contract with the heating and cooling cycles of normal engine operation; otherwise, manifold breakage will result.

b. Install new manifold-to-cylinder head gasket; coat both sides with gasket sealer. Install manifold, then washers in their proper locations (figure 5-53). Washers spanning intake and exhaust flanges must be flat. Replace those distorted by previous overtightening.

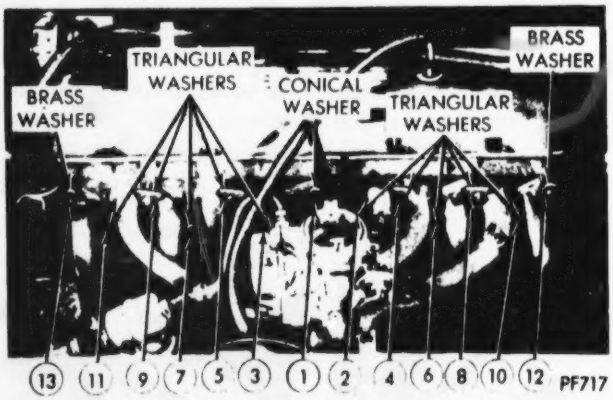


Figure 5-53. Manifold Washer Locations and Tightening Sequence

c. Install steel conical washer with cup side facing nut. Install brass washers as indicated in figure 5-53, with flat side facing manifold. Install nuts with cone side facing the washers.

d. Carefully snug intake-to-exhaust manifold screws and nut and manifold-to-cylinder head nuts.

CAUTION

Snug all nuts and screws to approximately 10 inch-pounds. DO NOT TIGHTEN.

e. Tighten inboard intake-to-exhaust manifold stud nut to 20 foot-pounds.

f. Tighten outboard intake-to-exhaust manifold screws to 20 foot-pounds.

g. Repeat tightening procedures (7) and (8) untill all three are at these specified torques.

h. Tighten manifold-to-cylinder head nuts to 120 inch-pounds in the tightening sequence shown in figure 9. DO NOT OVERTIGHTEN.

i. Install vacuum control tube from carburetor to distributor.

j. Connect exhaust pipe to exhaust manifold flange and tighten nuts to 30 foot-pounds.

k. Install fuel line and carburetor air cleaner.

5-93. BASIC ENGINE ASSEMBLY. (See figure 6-32.)

5-94. The basic engine assembly is the engine with all external accessories removed. It generally consists of the cylinder head, cylinder block, timing gear case and all internal parts. Disassembly and repair of the basic engine is treated by functional groups in the following paragraphs.

5-95. OIL PUMP ASSEMBLY.

5-96. REMOVAL.

a. The oil pump can be removed from the side of the engine without removing the oil pan, however, the oil pan must be removed in order to remove and clean the strainer.

b. Drain the oil pan and remove the oil pan attaching screws, oil pan, and all old gaskets.

c. Remove oil pump attaching bolts, and remove the pump from the side of the engine.

5-97. DISASSEMBLY.

a. Refer to figure 6-34, which presents the internal parts relationship of the oil pump assembly in an exploded view illustration.

b. Remove the pump cover and seal ring, and strainer.

c. Press off drive gear. Support the gear to keep load off of aluminum body.

d. Remove pump rotor and shaft and lift out the outer pump rotor.

e. Remove oil pressure relief valve plug and lift out spring and plunger.

5-98. INSPECTION AND REPAIR.

a. Clean all parts thoroughly. The mating face of the oil pump cover should be smooth. Replace cover if it is scratched or grooved.

b. Lay a straightedge across the oil pump cover surface. If a .0015 inch feeler gauge can be inserted between the cover and straightedge, the cover should be replaced.

c. If outer rotor length measures less than .649 inch, and diameter less than 2.469 inches, replace outer rotor. See figure 5-54.

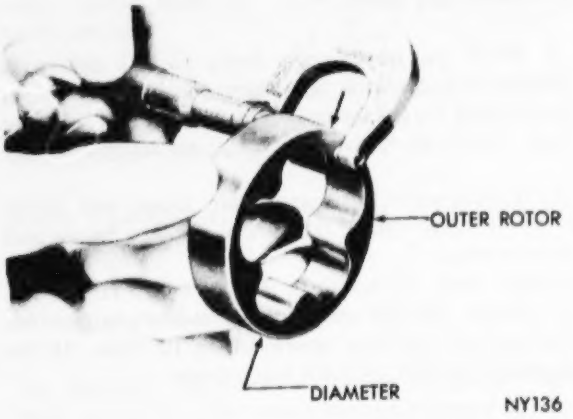


Figure 5-54. Checking Rotor Length

d. If inner rotor length measures less than .649 inch, replace inner rotor.

e. Slide outer rotor and inner rotor into pump body and place a straightedge across the face (between the bolt holes). See figure 5-55.

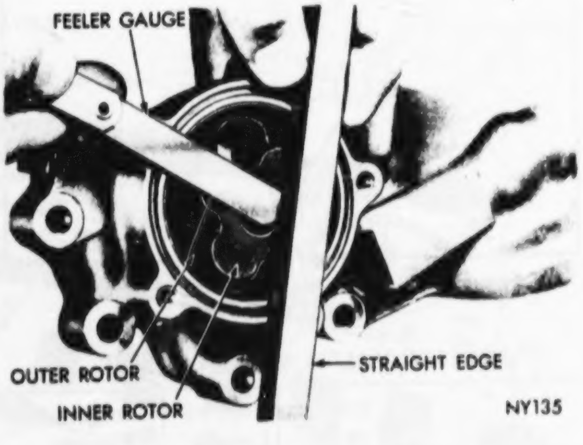


Figure 5-55. Measuring Clearance Over Rotors

f. If a feeler gauge of more than .004 inch can be inserted between rotors and straightedge, replace pump body.

g. Remove inner rotor and shaft leaving the outer rotor in pump cavity.

h. Press the outer rotor body to one side with fingers and measure the clearance between outer rotor and pump body. If measurement is more than .012 inch, replace the oil pump body.

i. If clearance between inner rotor and outer rotor is more than .010 inch, replace inner and outer rotors.

j. Check the oil pump relief valve plunger for scoring and for free operation in its bore. If the plunger is scored, replace the plunger.

k. The spring should conform to specifications on chart. If the spring is replaced, the same color spring should be used. An exception is where oil pressure is either above or below specifications.

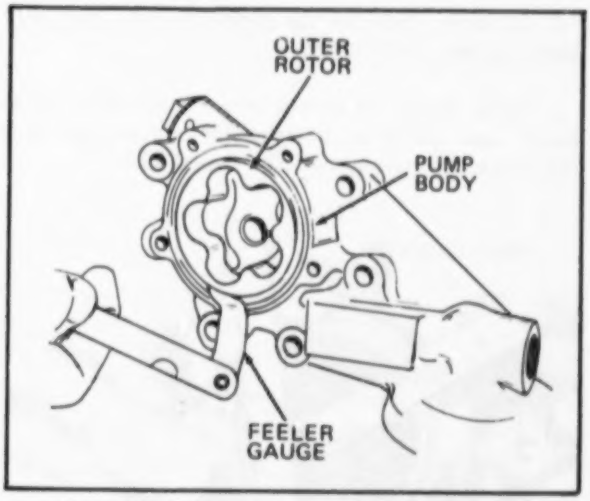


Figure 5-56. Measuring Outer Rotor Clearance

RELIEF VALVE SPRING CHART

Color	Free Length	Loaded Length	Compression Pounds
Gray (Light)	2-3/16"	1-39/64"	@ 11.85 to 12.85
Red (Standard,	2-19/64"	1-39/64"	@ 14.85 to 15.85
Brown (Heavy)	2-25/64"	1-39/64"	@ 17.90 to 18.90

5-99. REASSEMBLY. (See figure 6-34.)

a. Install relief valve plunger and spring in body bore. Install relief valve plug.

b. Install outer rotor, and inner rotor and shaft into body.

c. Press new drive gear onto pump shaft.

d. Install new seal rings between cover and body. Install cover and tighten attaching screws to 130 inch-pounds torque.

5-100. INSTALLATION.

a. Install strainer, and mount pump to engine. Tighten attaching screws to 200 inch-pounds torque.

b. Install new oil filter.

c. Using new oil pan gaskets, mount the oil pan, and install and tighten drain plug.

d. Refill engine crankcase with clean oil of the proper type and grade for present climatic conditions (see Lubrication Chart in Section IV).

5-101. CYLINDER HEAD AND VALVES.

5-102. REMOVAL.

a. Refer to figures 6-25 and 6-35 for exploded view illustrations and parts identification

b. Drain the cooling system.

c. Remove the carburetor air cleaner and fuel line.

d. Disconnect the throttle linkage.

e. Remove the vacuum control tube at carburetor and distributor.

f. Disconnect the spark plug wires by pulling the boot straight out in line with plug.

g. Disconnect the heat indicator sending unit wire.

h. Disconnect exhaust pipe at exhaust manifold flange.

i. Remove the intake and exhaust manifold and carburetor as an assembly.

j. Remove the outlet vent tube and cylinder head cover.

k. Remove the rocker arms and shaft assembly.

l. Remove the push rods and place them in their respective slots in holder.

m. Remove 14 head bolts and remove cylinder head.

n. Place cylinder head in holding fixture, and remove spark plugs, tubes and gaskets. (See figure 5-57.)

5-103. DISASSEMBLY.

a. Refer to the exploded view illustration, figure 6-35, and proceed as follows:

b. Deleted.

c. Remove rocker shaft bolts and retainers, and lift off the rocker arm and shaft assembly.

d. Refer to figure 5-58 when disassembling rocker arm and shaft assembly.

e. Compress each valve spring as shown in figure 5-59 in turn, and remove valve retaining locks, valve spring retainers, valve stem cup seals and valve springs.

f. Remove the burrs from the valve stem lock grooves to prevent damage to the valve guide when the valves are removed.

5-104. CLEANING, INSPECTION, AND REPAIR.

a. Clean the valves thoroughly and discard burned, warped and cracked valves.

b. Measure valve stems for wear. Intake valve stem diameter (new valve) should measure .372 to .373 inch and exhaust valve stem diameter (new valve) should measure .371 to .372 inch. If the wear exceeds .002 inch, replace the valve.

c. Remove carbon and varnish deposits from the inside of valve guides with valve guide reamer.

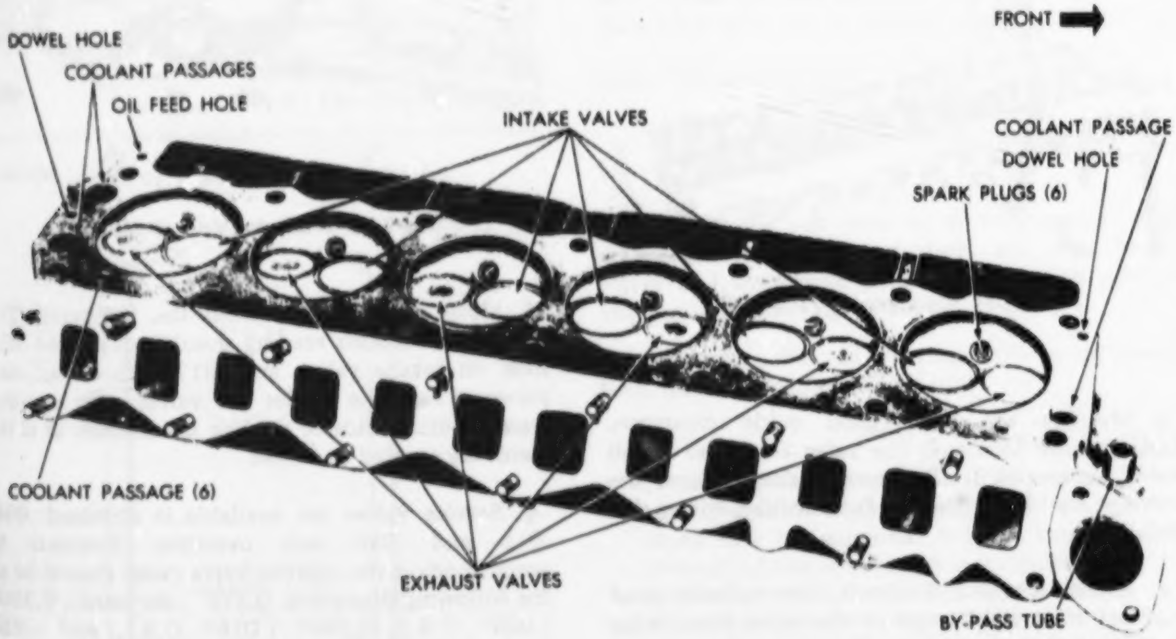


Figure 5-57. Cylinder Head

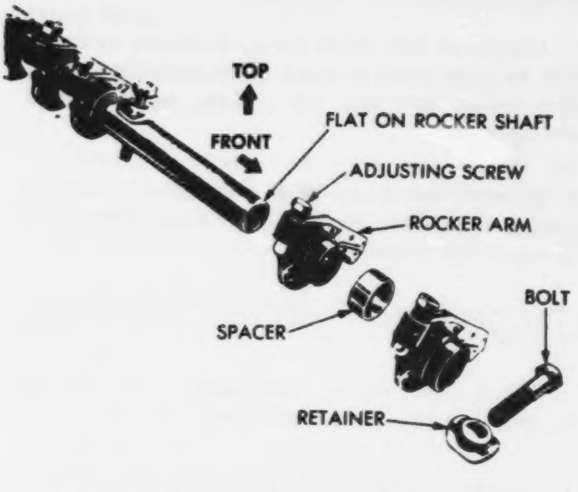

TOP
FRONT
FLAT ON ROCKER SHAFT
ADJUSTING SCREW
ROCKER ARM
BOLT
SPACER
RETAINER

Figure 5-58. Rocker Arms and Shaft Assembly

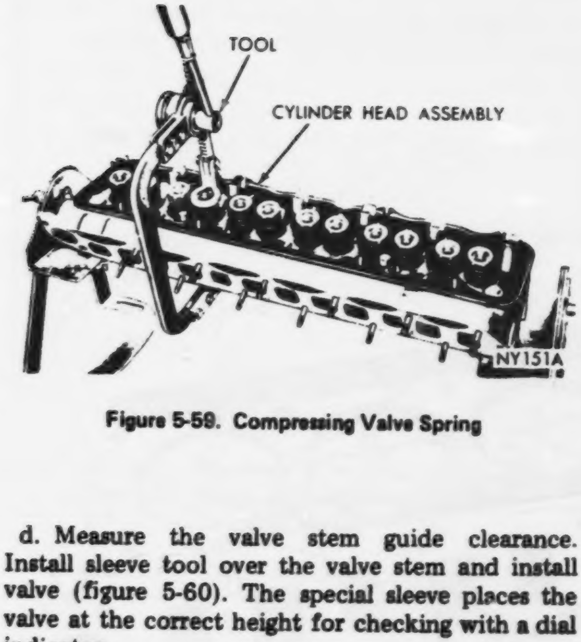

TOOL
CYLINDER HEAD ASSEMBLY
NY151A

Figure 5-59. Compressing Valve Spring

d. Measure the valve stem guide clearance. Install sleeve tool over the valve stem and install valve (figure 5-60). The special sleeve places the valve at the correct height for checking with a dial indicator.

e. Attach a dial indicator to the cylinder head and set it at right angle of the valve stem being measured (figure 5-61).

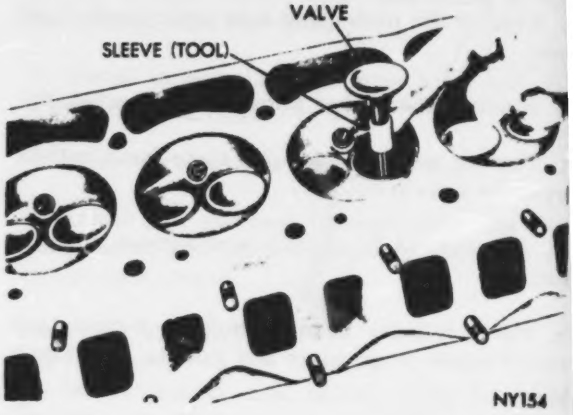

VALVE
SLEEVE (TOOL)
NY154

Figure 5-60. Installing Valve and Sleeve

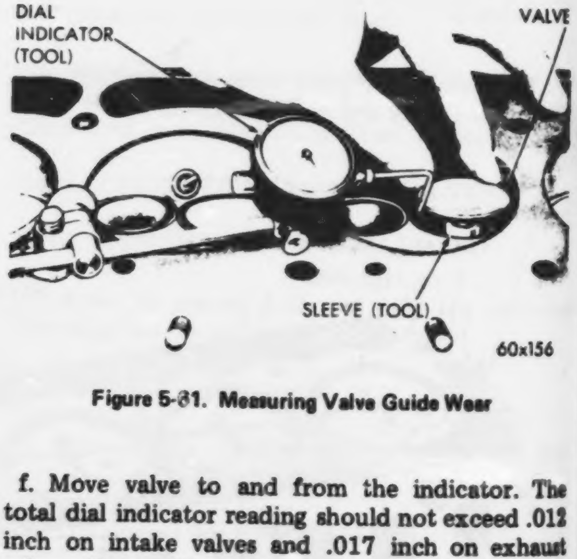

DIAL
INDICATOR
(TOOL)
VALVE
SLEEVE (TOOL)
60x156

Figure 5-61. Measuring Valve Guide Wear

f. Move valve to and from the indicator. The total dial indicator reading should not exceed .012 inch on intake valves and .017 inch on exhaust valves. Ream the guides for valves with oversize stems if dial indicator reading is excessive or if the stems are scuffed or scored.

g. Service valves are available in standard .005, .015 and .030 inch oversizes. Reamers to accommodate the oversize valve stems should be of the following diameters: 0.375" (standard), 0.380" (.005" O.S.), 0.390" (.015" O.S.), and .405" (.030" O.S.)

h. Slowly turn reamer by hand and clean guide thoroughly before installing new valves. Do not attempt to ream the valve guides from standard directly to .030 inch. Use step procedure of .005, .015 and .030 inch so the valve guides may be reamed true in relation to the valve seat.

5-105. REFACING VALVES AND VALVE SEATS.

a. The intake and exhaust valve seats and the intake valve face have a 45 degree angle. The exhaust valve face has a 43 degree angle. The valve face and valve seat angles are shown in figure 5-62.

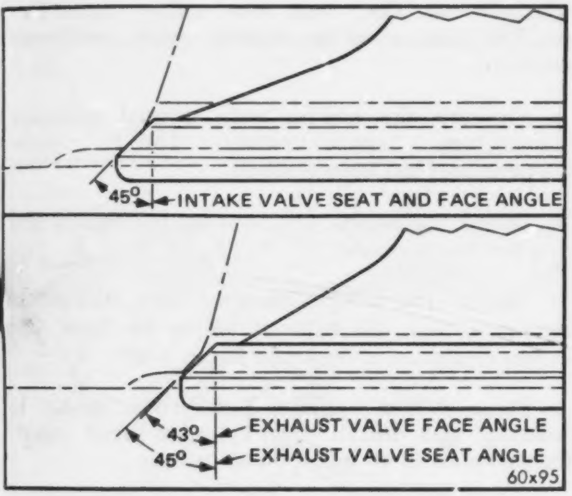


Figure 5-62. Valve Face and Seat Angles

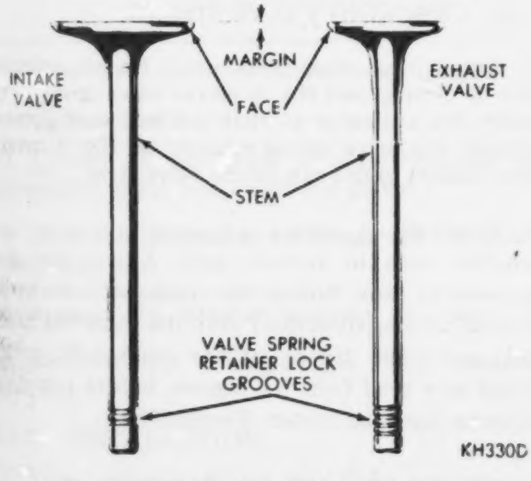


Figure 5-63. Intake and Exhaust Valves

b. Inspect the remaining margin after the valves are refaced (figure 5-63.) Valves with less than 3/64 inch margin should be discarded.

c. When refacing the valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

d. Measure the concentricity of valve seat using a dial indicator. The total runout should not exceed .003 inch (total indicator reading). When the seat is properly positioned, the width of the intake seats should be 1/16 to 3/32 inch. The width of exhaust seats should be 3/64 to 1/16 inch.

5-106. TESTING VALVE SPRINGS.

a. Whenever the valves have been removed for inspection, reconditioning or replacement, the valve springs should be tested. To test a spring, first determine the length at which the spring is to be tested. As an example: the compressed length of the spring to be tested is 1-5/16 inches. The valve springs should test 160 to 172 lbs when compressed to 1-5/16 inches. Discard springs that do not meet these specifications.

b. Inspect each valve spring for squareness with a steel square and surface plate. If the spring is more than 1/16 inch out of square, install a new spring.

5-107. REASSEMBLY.

a. Lubricate the valve stems and insert them in the cylinder head.

b. Install new cup seals on all valve stems (long seal on intake valve and short seal on exhaust valve) and over valve guides. Install valve springs and retainers. (See figure 5-64.)

c. Compress the valve springs with compressor tool, install locks and release tool.

Note

> If the valves and/or seats are reground, measure the installed height of springs. Make sure measurement is taken from the bottom of the spring seat in cylinder head to the bottom surface of spring retainer. (If spacers are installed, measure from the top of spacer). If height is greater than 1-11/16 inches, install a 1/16 inch spacer in head counterbore to bring spring height back to normal 1-5/8 inches to 1-11/16 inches.

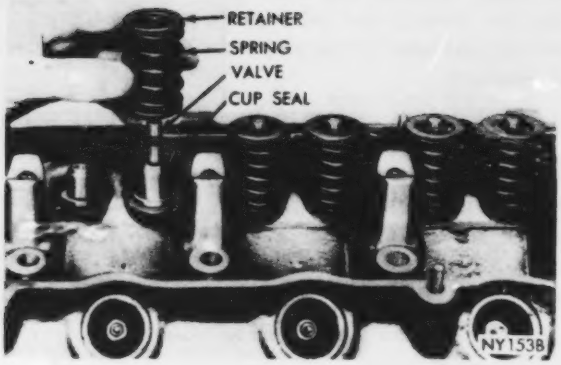


Figure 5-64. Installing Valves and Cup Seals

5-108. INSTALLATION.

a. Clean all gasket surfaces of cylinder block and cylinder head and install spark plugs.

b. Check all surfaces with a straight edge if there is any reason to suspect leakage.

c. Coat the new gasket with a suitable sealer. Install gasket and cylinder head.

d. Install cylinder head bolts. Starting at top center, tighten all cylinder head bolts to 50 ft-lbs in sequence (figure 4-42). Repeat the procedure, retightening all cylinder head bolts to 65 ft-lbs.

e. The rocker arms and shaft assembly must be installed as shown in figure 5-58. The flat on the end of the rocker shaft must be on top and point toward the front of the engine. This is necessary to provide proper lubrication to the rocker assemblies.

f. Install the rocker shaft retainers between rocker arms so they seat on rocker shaft and not on extended bushing of rocker arm.

g. Install the rocker shaft bolts. Tighten to 25 ft-lbs. Install long bolt at rear of engine. Tighten to 200 inch-pounds.

h. Loosen the 3 bolts holding the intake manifold to the exhaust manifold. This is required to maintain proper alignment.

i. Install intake and exhaust manifold and carburetor assembly to cylinder head with the cup side of conical washers facing nuts. Tighten according to procedure in figure 5-53.

j. Tighten 3 bolts holding the intake manifold to the exhaust manifold to 15 ft-lbs.

k. Connect the heat indicator sending unit wire, the throttle linkage and spark plug wires.

l. Install the vacuum control tube from carburetor to distributor.

m. Connect the exhaust pipe to exhaust manifold flange.

n. Install the fuel line and carburetor air cleaner.

o. Fill the cooling system with antifreeze solution.

p. Operate the engine until normal operating temperature (approximately 180°F. water temperature) has been reached.

q. Allow the engine to idle at approximately 550 rpm for five minutes.

r. Adjust the intake valves to have .012 inches clearance and the exhaust valves to have .024 inches clearance as shown in figure 4-40.

s. Place a new cylinder head cover gasket in position and install the cylinder head cover. Tighten nuts to 40 inch-pounds torque.

t. Connect crankcase ventilation system.

5-109. CHECKING VALVE TIMING.

a. Rotate the crankshaft until No. 6 exhaust valve is closing and No. 6 intake valve is opening. Install dial indicator so that the indicator pointer contacts the valve spring retainer on No. 1 intake valve parallel to the axis of the valve stem.

b. Turn No. 1 intake adjusting screw in one complete turn to remove lash. Adjust the dial indicator to zero. Rotate the crankshaft clockwise (normal running direction) until the valve has lifted .029 inch. The timing of the crankshaft pulley should now read from 12 degrees before top dead center to top dead center. Readjust lash.

c. If the reading is not within the specified limits:

1. Check sprocket index marks.

2. Inspect timing chain for wear.

3. Check accuracy of "0" mark on timing indicator.

5-110. TIMING SPROCKETS AND CHAIN.

5-111. REMOVAL.

a. Drain the cooling system.

b. Remove radiator and fan.

c. Install puller tool and pull the vibration damper assembly off the end of crankshaft (figure 5-65).

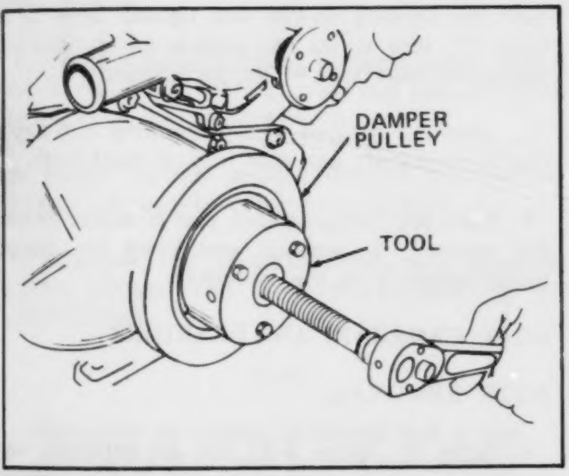


Figure 5-65. Removing Damper Pulley Assembly

d. Loosen oil pan bolts to allow clearance and remove the chain case cover and gasket.

e. Slide the crankshaft oil slinger off the end of crankshaft.

f. Remove the camshaft sprocket attaching bolt.

g. Remove the timing chain with camshaft sprocket.

5-112. INSTALLATION.

a. Turn crankshaft to line up centerline of camshaft and crankshaft with the timing mark on crankshaft sprocket.

b. Install camshaft sprocket and timing chain.

c. Line up the timing marks on the sprockets with the centerline of crankshaft and camshaft (figure 5-66).

d. Tighten camshaft sprocket lock bolt to 35 ft-lbs.

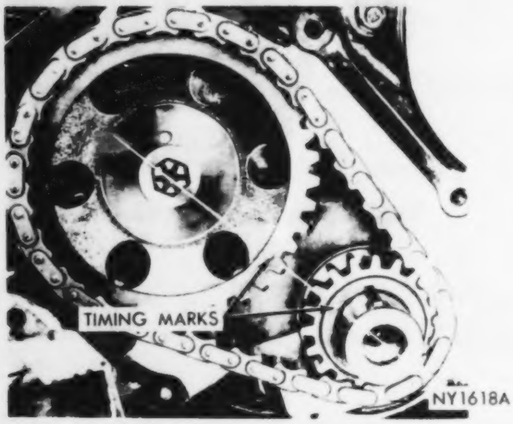


Figure 5-66. Alignment of Timing Marks

5-113. CHECKING TIMING CHAIN FOR STRETCH.

a. Place a scale next to timing chain so that any movement of the chain may be measured.

b. Place a torque wrench and socket over the camshaft sprocket lock bolt and apply torque in the direction of crankshaft rotation to take up the slack; 30 ft-lbs (cylinder head installed) or 15 ft-lbs (cylinder head removed). With a torque applied to camshaft sprocket bolt, the crankshaft should not be permitted to move. It may be necessary to block the crankshaft to prevent rotation.

c. Holding a scale with dimensional reading even with edge of a chain link, apply torque in the reverse direction 30 ft-lbs (cylinder head installed) or 15 ft-lbs (cylinder head removed) and note the amount of chain movement (figure 5-67).

d. If the chain movement exceeds 3/16 inch, install a new timing chain.

e. If chain is satisfactory, slide the crankshaft oil slinger over shaft and up against the sprocket (flange away from sprocket).

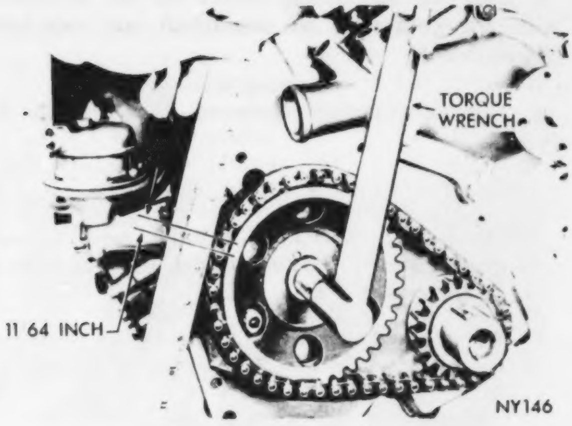


Figure 5-67. Measuring Chain Stretch

5-114. TIMING CHAIN COVER SEAL REPLACEMENT.

Note

> It is normal to find particles of neoprene collected between the seal retainer and crankshaft oil slinger after the seal has been in operation.

a. Remove timing chain case cover as outlined in paragraph 5-111.

b. Pull or drive out the old seal from the case cover, being extremely careful not to distort cover or seal bore.

c. Place a new seal in the cover opening, with the neoprene side down.

d. Using an arbor press and piloted arbor, press the seal into place.

e. The seal is properly installed when seal is flush with cover.

5-115. INSTALLING CHAIN CASE COVER AND VIBRATION DAMPER.

a. Be sure the mating surfaces of chain case cover and cylinder block are clean and free from burrs.

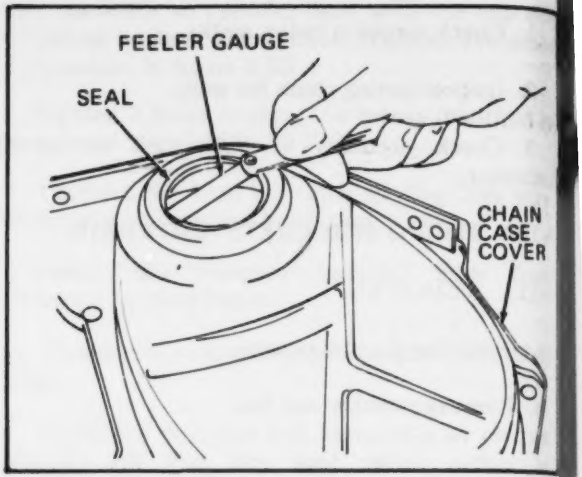


Figure 5-68. Checking Seal for Proper Seating

b. Using new gasket, slide the chain case cove over the locating dowels and tighten bolts to 3 ft-lbs. Be sure all oil pan gaskets are in place and tighten oil pans bolts to 200 inch-pounds.

c. Place the damper pulley assembly hub key in slot in crankshaft, and slide hub on crankshaft.

d. Place the installing tool, part of puller set used for removal, in position and press the dampe pulley assembly on the crankshaft.

5-116. CAMSHAFT AND BEARINGS.

5-117. REMOVAL.

a. Refer to figure 6-37 for an exploded view illustration of the parts included in the camshaft and bearings group.

b. Remove tappets, using magnetic tool.

c. Remove timing chain, sprockets, distributor and oil pump.

d. Remove fuel pump.

e. Carefully withdraw the camshaft through th bearing bores, without allowing the lobes to dra across the bearing surfaces.

f. Bearing shells must be removed with a special pilot arbor and adapters made for this purpose. The bearings are driven out of the cylinder block by using a rawhide mallet on the end of the pilot arbor.

5-118. CLEANING AND INSPECTION.

a. Check all tappets for wear at cam lobe contact face. If any negative crown, or dish exists the tappet must be replaced. Every tappet must have a definite crown.

b. Check camshaft for abnormal wear patterns or a broken distributor drive gear.

c. Replace worn or damaged camshaft or tappets.

5-119. INSTALLATION.

a. Install the new camshaft bearings with a pilot arbor by sliding the new camshaft bearing shell over the proper adapter.

b. Position bearing in the tool. Install horseshoe lock and drive bearing shell into place. The camshaft bearing oil hole must be in exact alignment with the drilled oil passage from the main bearing.

c. Install remaining shells in like manner. Install No. 1 camshaft bearing 3/32 inch inward from front face of the cylinder block.

d. Install a new welch plug at the rear of camshaft. Be sure this plug does not leak.

e. Lubricate the camshaft lobes and camshaft bearing journals and insert the camshaft in the cylinder block.

Note

Whenever an engine is rebuilt and a new camshaft and/or new tappets are installed, one quart of factory-recommended oil additive (MoPar Part Number 3419130) should be added to the engine oil to aid in break-in. The oil mixture should be left in the engine for a minimum of 25 hrs. of operation. Drain the oil mixture at the next normal oil change.

5-120. CONNECTING ROD AND PISTONS REMOVAL. (See figure 6-36)

a. Remove cylinder head assembly as outlined in paragraph 5-102.

b. Drain the oil pan, and remove the oil pan and oil pump strainer.

c. Before removing piston and rod assemblies, cut away the carbon ridge around the top of the cylinder bore with a ridge reamer.

d. Remove bearing cap nuts and bolts (13 and 12, figure 6-36), and remove bearing cap from connecting rod journal of the crankshaft.

e. Using a hammer handle, wooden rod or similar instrument, push the piston with rod assembled, out the top of the cylinder block.

f. Remove and discard old piston rings from the piston assembly.

g. Press out piston pins in an arbor press.

5-121. CRANKSHAFT AND BEARINGS REMOVAL.

a. Refer to figure 6-38 for parts identification.

b. Remove the oil pan and note bearing cap numbers.

c. Remove bearing caps, one at a time, providing adequate support for the crankshaft to prevent undue strain on the last caps to be removed.

d. Remove the crankshaft and upper bearing shells from the cylinder block.

5-122. CYLINDER BLOCK RECONDITIONING.

a. Cylinder Walls.

1. Cylinder walls which are badly scored, scuffed, scratched, or worn beyond specified limits should be rebored. Whatever type of boring equipment is used, boring operation should be closely coordinated with the fitting of pistons and rings in order that specified clearance may be maintained.

2. The cylinder bores should be checked for out-of-round and taper. If the cylinder bores show more than .005 inch out of round or .010 inch taper, the cylinder block should be rebored and honed and new pistons and rings fitted.

b. Honing Cylinder Bores.

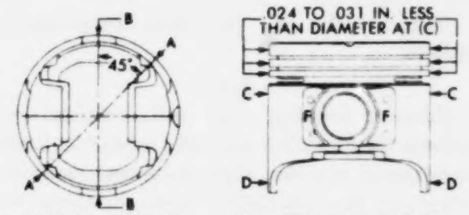
1. To remove light scoring, scuffing, or scratches from the cylinder walls, use a hone.

Usually, a few strokes will clean up a bore and maintain the required limits.

2. The cylinder walls should be deglazed, using cylinder surfacing hone equipped with No. 280 grit stones, prior to installation of the new rings or to smooth down the cylinder walls after rough honing.

3. A satisfactory finish can be obtained by giving each cylinder wall 20 strokes in 20 seconds with the hone so that a cross hatch pattern will be obtained.

4. The hone may be used for removing metal up to .005 inch. Be sure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and water be used with a brush and then thoroughly dried. When the bore can be wiped with a clean white cloth and be withdrawn clean, the bore is clean.



THE ELLIPTICAL SHAPE OF THE PISTON SKIRT SHOULD BE .008 TO .010 IN. LESS AT DIAMETER (A) THAN ACROSS THE THRUST FACES AT DIAMETER (B). MEASUREMENT IS MADE 1/8 IN. BELOW LOWER RING GROOVE

DIAMETERS AT (C) AND (D) CAN BE EQUAL OR DIAMETER AT (D) CAN BE .0015 IN. GREATER THAN (C)

NY221B

Figure 5-69. Piston Measurements

5-123. PISTONS. (See figure 5-69.) The pistons are cam ground so that the diameter at the pin boss is less than its diameter across the thrust face. This allows for expansion under normal operating conditions. The expansion forces the pin bosses away from each other, and the piston assumes a more round shape. Check pistons for taper and elliptical shape before they are fitted into the cylinder bores.

a. Finished Pistons.

1. All pistons are machined to the same weight in grams, regardless of oversize, to maintain piston balance. For cylinder bores which have been honed or rebored, all service pistons include pins and are available in standard and the following oversizes: 0.005, 0.020, 0.040 inch.

b. Fitting Pistons.

1. The piston and cylinder wall must be clean and dry. The specified clearance between the piston and the cylinder wall is 0.0005 to 0.0015 inch.

2. Pistons and cylinder bores should be measured at normal room temperature, 70 degrees F.

3. Measure the piston diameter at the top of skirt 90 degrees to the piston pin axis. (See figure 5-69.)

4. Measure the cylinder bores halfway down the cylinder bore and transverse to the engine crankshaft center line.

c. Fitting Rings.

1. Measure the piston ring gap about two inches from bottom of cylinder bore in which it is to be fitted. (An inverted piston can be used to push the rings down to insure positioning rings squarely in the cylinder wall.)

2. Insert the feeler stock in gap. The ring gap should be between 0.010 to 0.020 inch. The service set oil ring gap is 0.010-0.055 inch.

3. Measure the side clearance between piston ring and ring land. The clearance should be 0.0015 to 0.003 inch for the top compression ring and the intermediate ring, and 0.001 to 0.003 for the oil control ring. (See figure 5-70.)

4. Starting with the oil ring expander, place expander ring in the lower ring groove and install oil control ring using instructions in package.

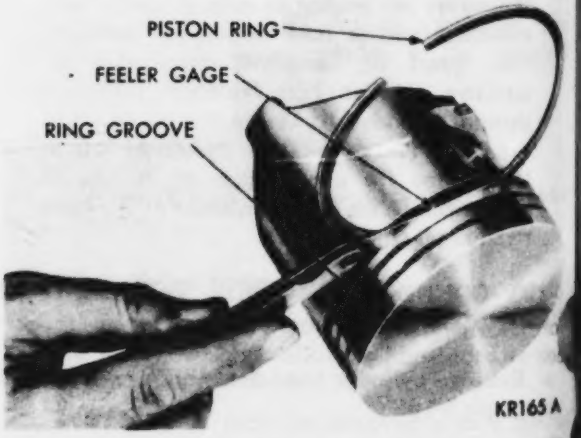


Figure 5-70. Measuring Piston Ring Clearance

5. Install the compression rings in middle and top grooves. Use ring installer to avoid breaking the rings. Be sure the mark "TOP" on each compression ring is to the top of piston.

5-124. PISTON PIN AND CONNECTION ROD ASSEMBLY.

a. Check the piston pin fit in the piston. It should be a sliding fit in the piston at 70 degrees F. Piston pins are supplied in standard sizes only.

b. Lubricate the piston pin holes in the piston and connecting rod.

c. Use a pilot arbor and hydraulic press to install piston pin.

d. Place piston, with "Notch Front" up, over pilot so that the pilot extends through the piston pin holes.

e. Position connecting rod over the pilot which extends through the piston hole. The oil hole in the connecting rod must point toward the direction shown in figure 5-71.

f. Press in the piston pin until piston pin bottoms on the pilot, properly positioning the pin in the connecting rod.

g. A torque of at least 15 ft-lbs should be required to cause the connecting rods to rotate upon the pin. Check with a spring scale applied to the lower part of connecting rod while holding the piston pin fixed.

h. If the connecting rod does not move (under 15 ft-lbs torque), the piston and connecting rod interference is satisfactory.

5-125. CONNECTING ROD BEARINGS. (See figure 6-36)

a. Installation.

1. Install connecting rod bearings so that small ormed tang fits into machined groove in onnecting rod.

2. Limits of taper or out-of-round on any crankshaft journal should be held to .001 inch. Bearings are available in standard .001, .002, .003, .010 and .012 inch undersize.

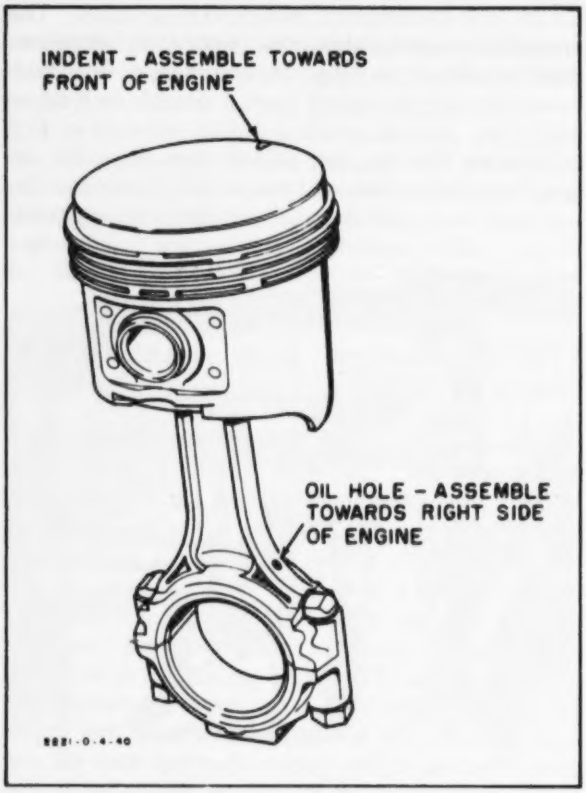

INDENT - ASSEMBLE TOWARDS FRONT OF ENGINE
OIL HOLE - ASSEMBLE TOWARDS RIGHT SIDE OF ENGINE
8821-0-4-40

Figure 5-71. Connecting Rod Orientation

3. Install the bearings in pairs. Do not use a new bearing with an old bearing. Do not file the rods or bearing caps.

b. Checking Clearance.

1. Connecting rod bearing clearance measurements can be made by the use of Plastigage with the engine in the chassis. After removing the connecting rod cap, wipe off the oil from the crankpin journal and bearing inserts. Place the Plastigage on bearing parallel with crankshaft. Reinstall the cap and tighten attaching nuts alternately to specified torque.

2. Remove cap and measure the width of the compressed material with the graduated scale to determine the bearing clearance. Desired clearance is from .005 to .0015 inches. If taper of the compressed material is evident, measure with the graduated scale. If the taper appears to exceed .005 inch, the journal should be checked with micrometers. Side play should be from .006 to .012 inch.

5-126. CRANKSHAFT MAIN JOURNALS.

The crankshaft journals should be checked for excessive wear, taper and scoring. Limits of taper or out-of-round on any crankshaft journal should be held to .001 inch. Journal grinding should not exceed .012 inch under the standard journal diameter. Do not grind the thrust faces of No. 3 main bearing. Do not nick the connecting rod or main bearing journal fillets. After regrinding, remove the rough edges from crankshaft oil holes and clean out all oil passages.

5-127. CRANKSHAFT MAIN BEARINGS. (See figure 5-72)

a. The Nos. 1, 2 and 4 lower main bearings are interchangeable. The Nos. 2 and 4 upper main bearings are interchangeable. The No. 1 upper main bearing is not interchangeable and is chamfered on the tab side for timing chain oiling and can be identified by a red mark on the edge of the bearing. Upper main bearings are grooved and lower main bearings are plain and are not interchangeable. The No. 3 upper and lower main bearings are flanged to carry the crankshaft thrust load and are not interchangeable with any other main bearings in the engine. Bearings that are not badly worn or pitted should be reinstalled in the same bearing bore.

b. The bearing caps are not interchangeable and numbers should be marked at removal to insure correct assembly. Bearings are available in standard and the following undersizes: .001, .002, .003, .010 and .012 inch. Never install an undersize bearing that will reduce the clearance below specifications.

5-128. CHECKING MAIN BEARING CLEARANCE.

a. Use the method described under paragraph 5-125b, "Connecting Rod Bearings".

CAUTION

If bearings are measured with the engine in an upright position the crankshaft must be supported in order to take up clearance between the upper bearing insert and the crankshaft journal.

b. Support crankshaft by snugging bearing caps of the adjacent bearings with a strip of 0.005 to 0.015 inch cardboard between lower bearing and journal. Use extreme caution when this is done to avoid unnecessary strain on the crankshaft or bearings, or false reading may be obtained. Do not rotate crankshaft while Plastigage is installed. Be sure to remove cardboard before reinstalling oil pan.

c. It is permissible to use one .001 inch undersize bearing shell with one standard bearing shell, or one .002 inch undersize bearing shell with one .001 inch undersize shell. Always use the small diameter bearing half as the upper. Do not use a new bearing with a used bearing and never use an upper bearing half more than .001 inch smaller than the lower bearing half.

d. Measure crankshaft end play to .002-.007 inch. If end play exceeds .007 inch, install new number 3 main bearing.

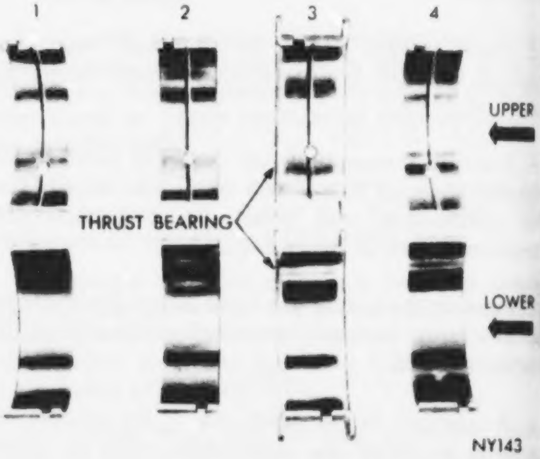


Figure 5-72. Main Bearing Identification

5-129. PISTON AND CONNECTING ROD INSTALLATION.

a. Compression ring gaps must be diametrically opposite one another and not in line with the oil ring gap.

b. Turn the oil ring expander gap toward the right side of the engine. Turn the oil ring gap toward the left side of the engine.

c. Immerse the piston head and rings in cle engine oil. Slide the ring compressor over th piston and tighten with wrench. Position of ring must not change during this operation.

d. The notch on the top of the piston must point toward the left side (manifold side) of the engine to lubricate the cylinder walls.

e. Screw the connecting rod bolt protector on one rod bolt, and insert the rod and piston into cylinder bore. Rotate the crankshaft so that connecting rod journal is on center of cylinder bore.

f. Guide the rod over the crankshaft journal.

g. Tap piston down in cylinder bore, using the handle of a hammer. At the same time, guide connecting rod into position on crankshaft journal.

h. Install the rod caps and tighten nuts to 45 ft-lbs.

5-130. REAR MAIN SEAL REPLACEMENT.

a. With crankshaft removed, install a new oil seal into cylinder block groove so that both ends protrude.

b. Force seal into position until it is fully seated. A semicircular tool is available which is especially made for this purpose.

c. When seal is fully seated in groove, cut off the protruding ends.

d. Repeat steps a, b, and c to install lower seal half into seal retainer.

e. Install the two side seals into grooves in seal retainer.

f. Install seal retainer and tighten attaching screws to 30 ft-lbs torque.

5-131. TRANSMISSION.

5-132. HYDRAULIC CONTROL PRESSURE TESTS AND ADJUSTMENTS.

5-133. The hydraulic control pressure tests and adjustments outlined below should always be performed prior to removal of the transmission for any major repair. Results of these tests will be useful in diagnosing the cause of transmission malfunction.

-134. **LINE PRESSURE AND FRONT SERVO RELEASE PRESSURE.** Line pressure and front servo release pressure tests must be made in D (drive) position with rear wheels free to turn. The transmission fluid must be at operating temperature (150°F to 200°F).

a. Install an engine tachometer, raise vehicle on a hoist and position tachometer so it can be read under the vehicle.

b. Connect two 0-100 psi pressure gauges to pressure take-off points at the side of accumulator and front servo release (figure 5-73).

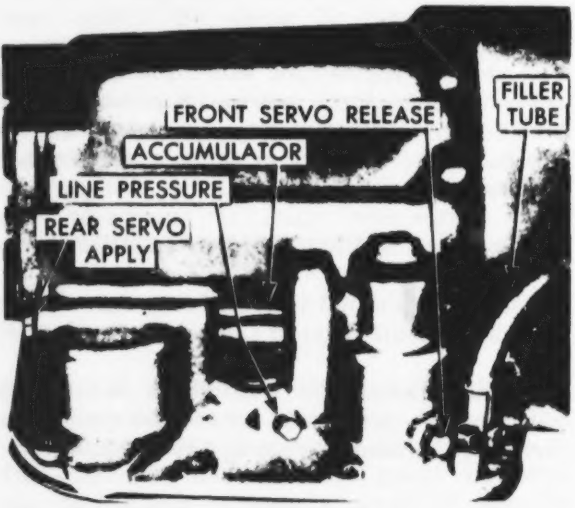


Figure 5-73. Pressure Test Locations (Right Side)

c. With control in D (drive) position, speed up engine slightly until transmission shifts into direct. (Front servo release will be pressurized in direct). Reduce engine speed slowly to 1,000 rpm. Line pressure at this time (1,000 rpm) must be 54-60 psi, and front servo release pressure must not be more than 3 psi below line pressure.

d. Disconnect throttle lever bracket from transmission throttle lever and move lever gradually to full throttle position. Line pressure must rise to a maximum of 90-96 psi just before or at kickdown into low gear. Front servo release pressure must follow line pressure up to the kickdown point and should not be more than 3 psi below line pressure.

e. If line pressure is not 54-60 psi at 1,000 rpm, adjust pressure as outlined in paragraph 5-139.

f. If front servo release pressures are less than pressures specified and line pressures are within limits, there is excessive leakage in the front clutch and/or front servo circuits. Always inspect the external transmission throttle lever for looseness on the valve body shaft when making pressure tests.

5-135. LUBRICATION PRESSURES. The lubrication pressure test should be made at the same time that line pressure and front servo release pressures are tested.

a. Install a "tee" fitting between cooler return line fitting and fitting hole in transmission case at rear of left side of transmission (figure 5-74). Connect a 0-100 psi pressure gauge to the "tee" fitting.

b. At 1,000 engine rpm, with throttle closed and transmission in direct, lubrication pressure should be 5-15 psi. Lubrication pressure will be approximately doubled as throttle is opened to maximum line pressure.

5-136. REAR SERVO APPLY PRESSURE.

a. Connect a 0-300 psi pressure gauge to apply pressure take-off point at rear servo (figure 5-74).

b. With transmission control in R (reverse) position and engine speed set at 1600 rpm, reverse servo apply pressure should be 240-280 psi.

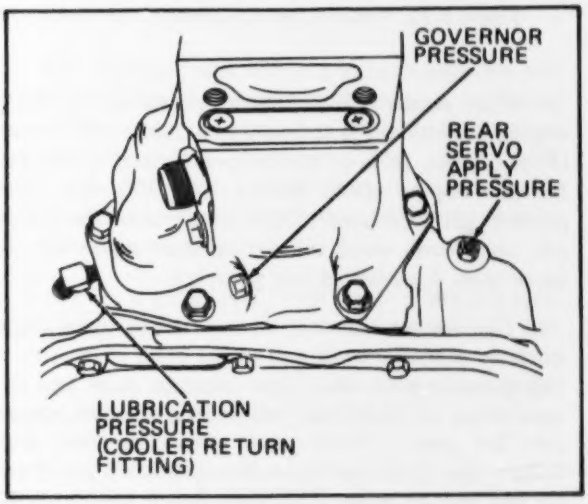

GOVERNOR PRESSURE
REAR SERVO APPLY PRESSURE
LUBRICATION PRESSURE (COOLER RETURN FITTING)

Figure 5-74. Pressure Test Locations (Rear of Case)

5-137. GOVERNOR PRESSURE.

a. Connect a 0-100 psi pressure gauge to governor pressure take-off point, located at lower left side of extension near the mounting flange (figure 5-74).

b. Governor pressures should fall within th ranges: 1st gear, 19-22 psi; 2nd gear, 43-47 psi; gear, 69-73 psi, as engine speed increases. governor pressures are incorrect in these ranges, the governor valve and/or weights probably sticking.

5-138. THROTTLE PRESSURE. No provisio are made to test throttle pressure. Incorr throttle pressure should only be suspected if throttle shift speeds are either very delayed occur too early in relation to vehicle speeds. which case, throttle lever bracket should be adjust before throttle pressure setting is adjusted. Refer Paragraph 5-165.

5-139. LINE PRESSURE ADJUSTMENT. incorrect throttle pressure setting will ca incorrect line pressure reading even though li pressure adjustment is correct. Always inspect correct throttle pressure adjustment befo adjusting line pressure. Before adjusting li pressure, measure distance between the man valve (valve in 1-low position) and line press adjusting screw (figure 5-75). This measureme must be 1-7/8 inches; correct by loosening spri retainer screws and repositioning the spri retainer. The regulator valve may cock and hang in its bore if spring retainer is out of position.

a. If line pressure is not correct, it will necessary to remove valve body assembly perform the adjustment.

b. The approximate adjustment is 1-5/16 inche measured from valve body to inner edge of th adjusting nut (figure 5-76). However, due manufacturing tolerances, the adjustment can varied to obtain specified line pressure.

c. The adjusting screw may be turned with allen wrench. One complete turn of screw chang closed throttle line pressure approximately 1-2 psi. Turning screw counterclockwise increas pressure, and clockwise decreases pressure.

5-140. THROTTLE PRESSURE ADJUSTMEN Throttle pressure cannot be tested accurat therefore, the adjustment should be checked malfunction is evident.

a. Remove valve body assembly fro transmission to perform the adjustment.

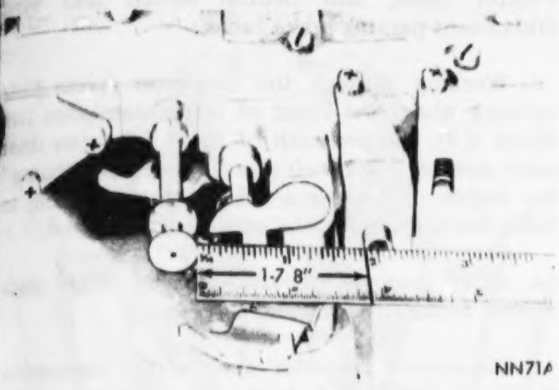


Figure 5-75. Measuring Spring Retainer Location

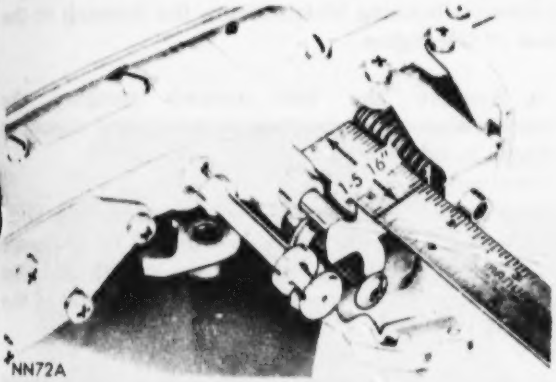


Figure 5-76. Line Pressure Adjustment

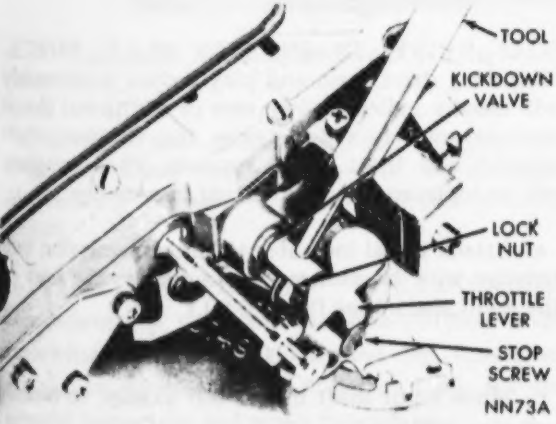


Figure 5-77. Throttle Pressure Adjustment

b. Loosen throttle lever stop screw lock nut and back off screw approximately five turns (figure 5-77).

c. Insert gauge pin tool between throttle lever cam and the kickdown valve.

d. By pushing in on the tool, compress kickdown valve against its spring so throttle valve is completely bottomed inside the valve body.

e. As force is being exerted to compress spring, tighten throttle lever stop screw finger tight against the throttle lever tang with throttle lever cam touching tool and the throttle valve bottomed. Be sure adjustment is made with spring fully compressed and valve bottomed in the valve body.

f. Remove tool and tighten stop screw lock nut securely.

5-141. AIR PRESSURE TESTS. A "NO DRIVE" condition might exist even with correct fluid pressure, because of inoperative clutches or bands. The inoperative units, clutches, bands and servos can be located through a series of tests by substituting air pressure for fluid pressure (figure 5-78). The front and rear clutches, kickdown servo, and low-reverse servo may be tested by applying air pressure to their respective passage after the valve body assembly has been removed. To make the air pressure test, proceed as follows:

CAUTION

Compressed air supply must be free of all dirt and moisture. Use a pressure of 30 to 100 psi.

a. Front Clutch. Apply air pressure to front clutch "apply" passage and listen for a dull "thud" which indicates that front clutch is operating. Hold air pressure on for a few seconds and inspect system for excessive oil leaks.

b. Rear Clutch. Apply air pressure to rear clutch "apply" passage and listen for a dull "thud" which indicates that rear clutch is operating. Also check for excessive oil leaks. If a dull "thud" cannot be heard in the clutches, place finger tips on clutch housing and again apply air pressure. Movement of the piston can be felt as clutch is applied.

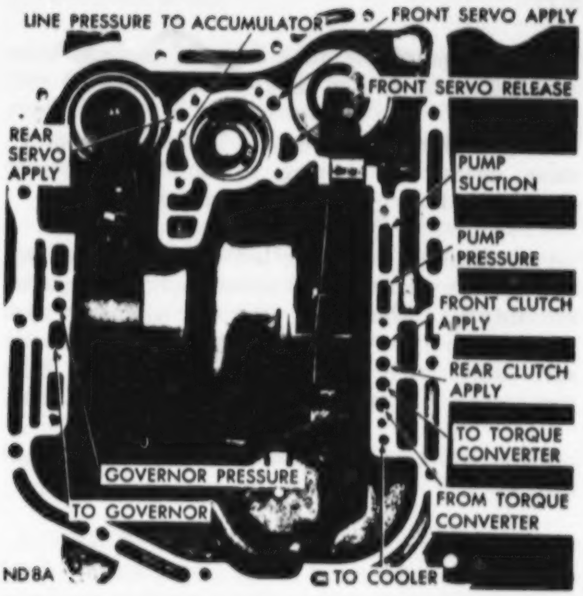


Figure 5-78. Air Pressure Tests

c. Kickdown Servo. Direct air pressure into front servo "apply" passage. Operation of servo is indicated by a tightening of the front band. Spring tension on servo piston should release the band.

d. Low and Reverse Servo. Direct air pressure into servo "apply" passage. Operation of servo is indicated by a tightening of the rear band. Spring tension on servo piston should release the band. If the clutches and servos operate properly, no upshift or erratic shift conditions indicate that the malfunction exists in the valve body.

5-142. TRANSMISSION REMOVAL.

Note

Transmission may also be removed while assembled to the engine. Refer to paragraph 5-46 for procedure.

a. Drain all fluid from the transmission and the torque converter. (See paragraph 4-19.)

b. Remove the forward and rear floorplates from the operator's compartment.

c. Disconnect transmission oil cooler lines, shi control cable, and neutral switch lead wir Disconnect parking brake cable.

d. Working through the converter access pla opening under the front of the transmission (se figure 4-8), remove each of the 4 converter driv plate screws. After each screw is removed, "bump" the engine over using a remote starter switch, t bring the next screw into position for removal.

e. After removal of all converter drive pla screws, remove the starting motor.

f. Disconnect propeller shaft at the companio flange on the parking brake drum, or remove th attaching hardware securing the flange to th drum.

g. Remove the screws around the torque converter housing which secure the housing to th rear of the engine.

h. Remove the two screws securing th transmission support crossmember to the chassis a shown in figure 5-13.

i. Attach hoist or sling to transmission case. Slid transmission to the rear a few inches to diseng the torque converter from the crankshaft and drive plate, and lift the transmission up and out of th chassis.

j. Place transmission assembly in a repair stand such as that shown in figure 5-79 to facilitate handling of the transmission during disassembly.

k. Remove the torque converter from the front of the transmission.

5-143. DRIVE TRAIN END PLAY CHECK. Measuring drive train end play before disassembly will usually indicate when new or additional thru washers are required between the reaction shaft support and front clutch retainer. These washers will be replaced or added during reassembly.

a. Attach a dial indicator to the transmission bel housing with its plunger sealed against the end o the input shaft. (See figure 5-80.)

b. Move input shaft in and out axially, to obtai end play reading.

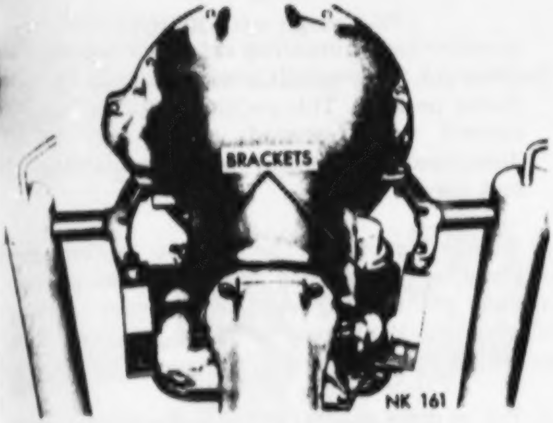


Figure 5-79. Transmission Installed in Repair Stand

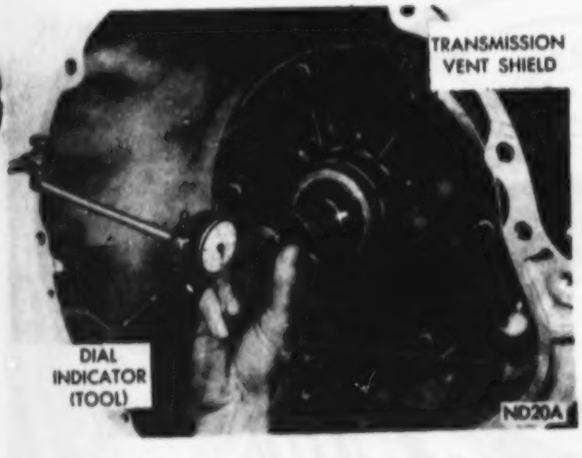


Figure 5-80. Measuring Drive Train End Play

c. Record the total indicator reading for reference when reassembling the transmission. Maximum permissible end play is 0.036 to 0.084 inches.

-144. TRANSMISSION DISASSEMBLY.

Disassembly of the transmission is covered in the following paragraphs, subdivided by functional groups or subassemblies. Refer to table 5-1 for general inspection and repair procedures.

5-145. PARKING BRAKE ASSEMBLY.

a. Disconnect propeller shaft at parking brake drum flange.

b. Hold brake drum flange with large wrench, and remove retaining nut and washer (figure 5-81).

c. Attach puller tool (if necessary) and remove drum and flange assembly.

d. Remove brake shoe adjusting nut cover plate and loosen cable guide clamp bolt on brake support. Disengage ball end of cable from operating lever and remove cable from the brake support. (See figure 5-82.)

e. Remove brake support grease shield spring, and remove grease shield (see figure 5-83). Be careful not to damage neoprene spacer in back of shield during removal.

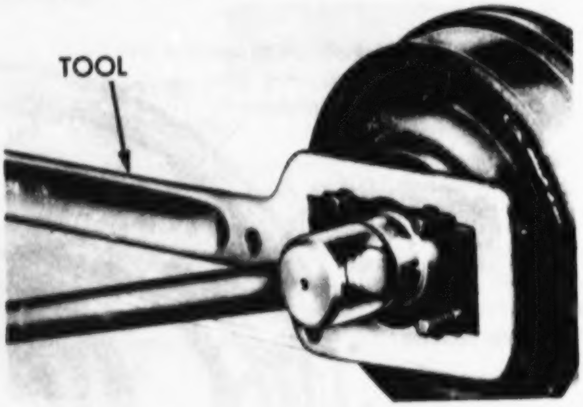


Figure 5-81. Removing Brake Drum Flange Nut

f. Remove anchor pin locking washer and shoe guide.

g. Slide brake assembly off anchor pin and extension housing.

h. Remove neoprene spacer and steel sleeve from back of brake support.

5-146. EXTENSION HOUSING AND BEARING.

a. Disconnect front end of propeller shaft and remove the parking brake assembly, if not done previously.

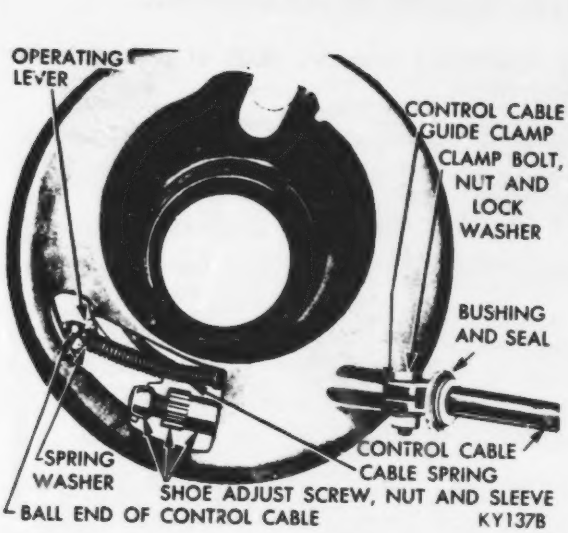

OPERATING LEVER
CONTROL CABLE GUIDE CLAMP
CLAMP BOLT, NUT AND LOCK WASHER
BUSHING AND SEAL
CONTROL CABLE
CABLE SPRING
SPRING WASHER
SHOE ADJUST SCREW, NUT AND SLEEVE
BALL END OF CONTROL CABLE
KY137B

Figure 5-82. Cable Attachment

b. Drain approximately two quarts of fluid fro transmission, if not already drained.

Note

In removing or installing extension housing (Step d.), the gearshift lever must be in "1" (Low) position. This positions parking lock control rod rearward so it can be disengaged or engaged with the parking lock sprag.

c. Remove extension housing to transmissio bolts and tap the housing lightly to break it loos Carefully pull housing rearward to remove parkin lock control knob past the parking sprag, the remove the housing.

d. Pry or drive seal out of extension housing wit a long blunt drift. Be sure not to mar oil sea surface in the housing.

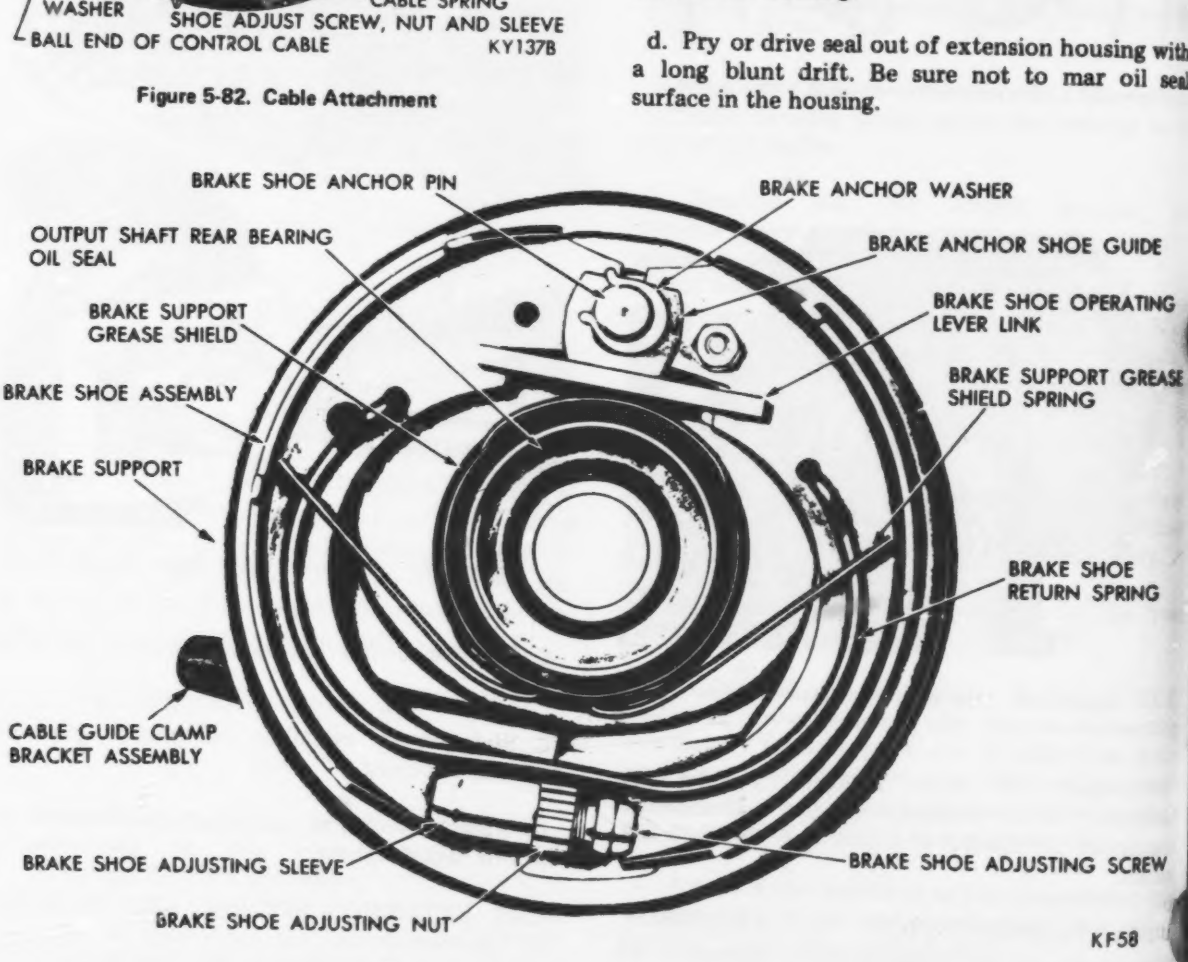

BRAKE SHOE ANCHOR PIN
BRAKE ANCHOR WASHER
OUTPUT SHAFT REAR BEARING OIL SEAL
BRAKE ANCHOR SHOE GUIDE
BRAKE SUPPORT GREASE SHIELD
BRAKE SHOE OPERATING LEVER LINK
BRAKE SHOE ASSEMBLY
BRAKE SUPPORT GREASE SHIELD SPRING
BRAKE SUPPORT
BRAKE SHOE RETURN SPRING
CABLE GUIDE CLAMP BRACKET ASSEMBLY
BRAKE SHOE ADJUSTING SLEEVE
BRAKE SHOE ADJUSTING SCREW
BRAKE SHOE ADJUSTING NUT
KF58

Figure 5-83. Parking Brake Internal Details

e. Remove bearing snap ring from the extension housing. Drive the bearing rearward out of housing with a pilot arbor, or blunt drift. (See figure 5-84.)

5-147. GOVERNOR. (See figure 5-85.)

a. Remove extension housing and output shaft bearing.

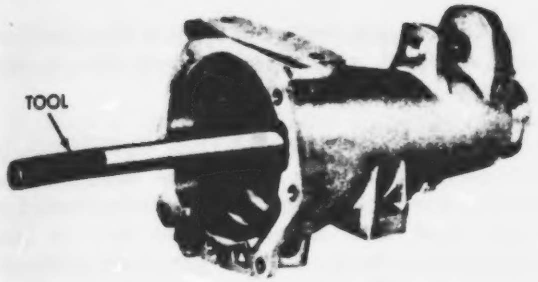


Figure 5-84. Removing Output Shaft Bearing or Seal

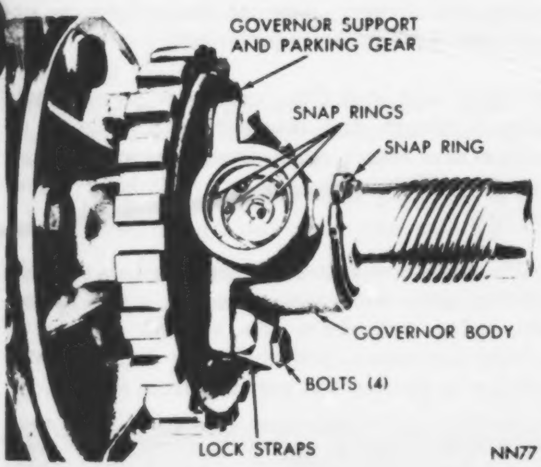


Figure 5-85. Governor Shaft and Weight Snap Rings

b. Carefully pry snap ring from the weight end of governor valve shaft. Slide valve and shaft assembly out of the governor body.

c. Remove large snap ring from weight end of the governor body, lift out the governor weight assembly.

d. Remove snap ring from inside the governor weight, remove inner weight and spring from the outer weight. Figure 6-44 shows a disassembled view of the governor assembly.

e. Remove snap ring from behind the governor body, then slide body and support assembly off the output shaft. If necessary remove four bolts and separate governor from the support.

5-148. STARTER RING GEAR REPLACEMENT.

The starter ring gear is mounted directly on the outer diameter of the torque converter front cover. With torque converter removed from the vehicle, replacement of gear is as follows:

a. Removal.

1. Cut through the weld material at rear side of ring gear with a hack saw or grinding wheel. Be careful not to cut or grind into the front cover stamping.

2. Scribe a heavy line on front cover next to front face of the ring gear to aid in locating the new gear.

3. Support converter with the four lug faces resting on blocks of wood. The converter must not rest on the front cover hub during this operation. Using a blunt chisel or drift and hammer, tap downward on ring gear near the welded areas to break any remaining weld material. Tap around the ring gear until it comes off the converter. (See figure 5-86.)

4. Smooth off weld areas on the cover with a file.

b. Installation.

1. Any of the following methods may be used to heat and expand the starter ring gear for installation on the converter.

2. Oven: Place ring gear in Oven, and set temperature at 200 degrees F. Allow ring gear to remain in Oven for 15 to 20 minutes.

3. Boiling water: Place ring gear in a shallow container, add water, and heat for approximately eight minutes after water has come to a boil.

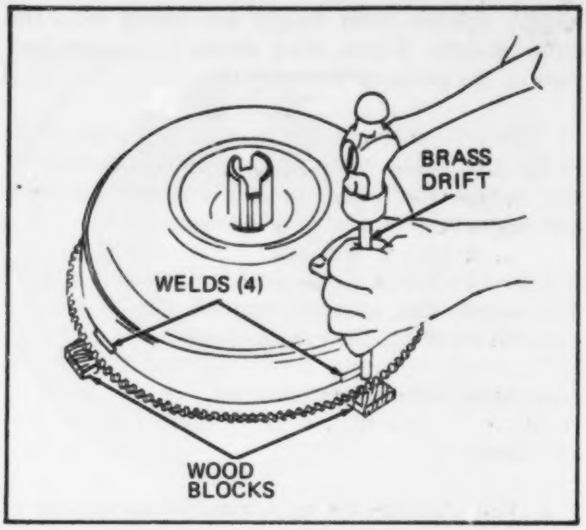


Figure 5-86. Removing Starter Ring Gear

4. Steam: Place ring gear on a flat surface and direct a steam flow around gear for approximately two minutes.

5. Flame: Place ring gear squarely on a flat surface. Using a medium size tip, direct a slow flame evenly around inner rim of the gear. Do not apply flame to the gear teeth. Place a few drops of water on face of gear at intervals during the heating process. When gear is hot enough to just boil the water, installation of gear on the torque converter can be made.

6. After ring gear is expanded by heating, place gear in position on the converter front cover. Tap gear on the cover evenly with a plastic or rawhide mallet until front face of the gear is even with scribed line (made during removal) on the front cover. Make sure gear is even with scribed line around the full circumference of front cover.

7. Reweld ring gear to the torque converter front cover, being careful to place, as nearly as possible, the same amount of weld material in exactly the same location as was used in the original weld. This is necessary in order to maintain proper balance of the unit. Place welds alternately on opposite sides of the converter to minimize distortion.

8. The following suggestions are offered as an aid in making the weld.

a. Do not gas weld.

b. Use a D.C. welder that is set at straig polarity or an A.C. welder if proper electrode available.

c. Use a 1/8 inch diameter welding rod, and welding current of 80 to 125 amps.

d. Direct the arc at intersection of the gear front cover from an angle of 45 degrees from re face of the gear.

9. Inspect gear teeth and remove all nicks where metal is raised, weld metal splatter, etc., in order to ensure quiet starter operation.

5-149. TORQUE CONVERTER FLUSHING. In the event that any part has failed in the transmission, the converter should be flushed to insure that fine metal particles are not later transferred back into the reconditioned transmission. The converter must be removed from vehicle for flushing, as the converter should never be rotated by the starter with transmission removed.

a. Place converter in an upright position and pour two quarts of new clean solvent or kerosene into converter through the impeller hub.

b. Turn and shake the converter so as to swirl solvent through the internal parts. Turning the turbine and stator with transmission input and reaction shafts will aid in dislodging foreign material.

c. Position converter in its normal operating position with drain plug at lowest point. Remove drain plug and drain the solvent. Rotate the turbine and stator, and shake the converter while draining to prevent dirt particles from settling.

d. Repeat flushing operation at least once, or a many times as required until the solvent or kerosene drained out is clear.

e. After flushing, shake and rotate converter several times with drain plug out to remove any residual solvent and dirt. Flush any remainin solvent from converter with two quarts of new transmission fluid. This will prevent any adverse effect the solvent may have on transmission seals. Install drain plug and tighten to 14 ft-lbs.

5-150. VALVE BODY AND ACCUMULATOR PISTON. (See figure 6-39 for exploded view.)

a. Remove drain plug from transmission oil pan and drain the transmission fluid. Remove oil pan and gasket.

b. Disconnect throttle lever bracket and gearshift linkage from levers on the transmission. Loosen clamp bolts and remove the levers.

c. Remove E-clip, securing parking lock rod to the valve body manual lever.

d. Place a drain pan under transmission, then remove the ten hex-head valve body to transmission case bolts. Hold valve body in position while removing the bolts.

e. While lowering valve body down out of the transmission case, disconnect parking lock rod from the lever.

Note

To remove parking lock rod, pull it forward out of the case. If necessary, rotate propeller shaft to align parking gear and sprag to permit knob on end of control rod to pass the sprag.

f. Withdraw accumulator piston from the transmission case. Inspect piston for scoring, and the rings for wear or breakage. Replace as required.

g. If valve body manual lever shaft seal requires replacement, drive it out of the case with a punch.

h. Drive a new seal into the case with a 15/16 inch socket and hammer, as shown in figure 5-87.

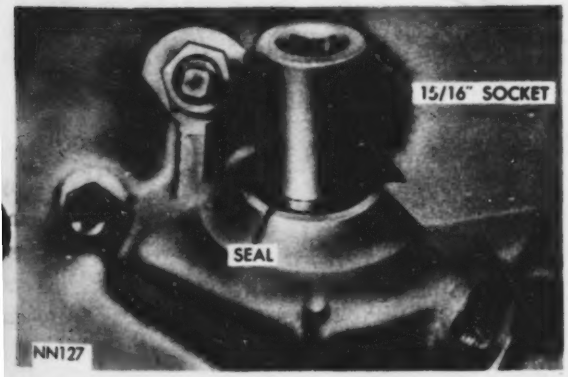

15/16" SOCKET
SEAL
NN127

Figure 5-87. Installing Manual Lever Shaft Seal

5-151. VALVE BODY DISASSEMBLY. (See figure 6-41.)

CAUTION

Never clamp any portion of the valve body or transfer plate in a vise. Any slight distortion of the aluminum body or transfer plate will result in sticking valves, excessive leakage or both. When removing or installing valve or plugs, slide them in or out carefully. Do not use force.

a. Place valve body assembly on repair stand. Remove three screws from fluid filter and lift off the filter.

b. While holding spring retainer firmly against the spring force, remove the three bracket retaining screws. (See figure 5-88.)

c. Remove the spring retainer, torque converter control valve spring, and regulator valve spring with line pressure adjusting screw assembly.

Note

Do not alter setting of the line pressure adjusting screw and nut. The nut has an interference thread and does not turn easily on the screw.

d. Slide regulator valve out of the valve body. Slide torque converter control valve out of the valve body.

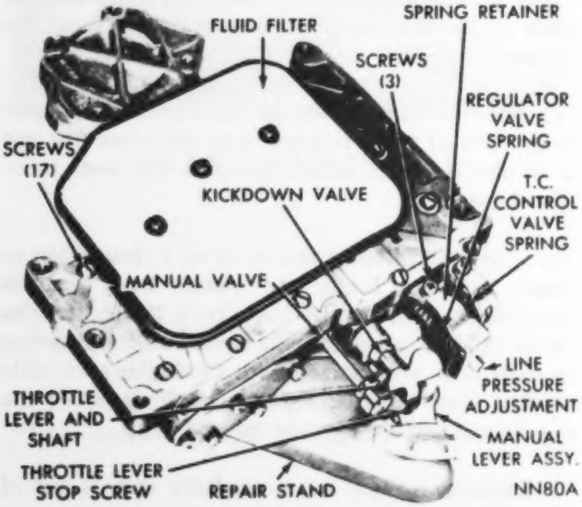

FLUID FILTER
SPRING RETAINER
SCREWS (3)
REGULATOR VALVE SPRING
SCREWS (17)
KICKDOWN VALVE
T.C. CONTROL VALVE SPRING
MANUAL VALVE
LINE PRESSURE ADJUSTMENT
THROTTLE LEVER AND SHAFT
MANUAL LEVER ASSY.
THROTTLE LEVER STOP SCREW
REPAIR STAND
NN80A

Figure 5-88. Valve Body and Control Assembly

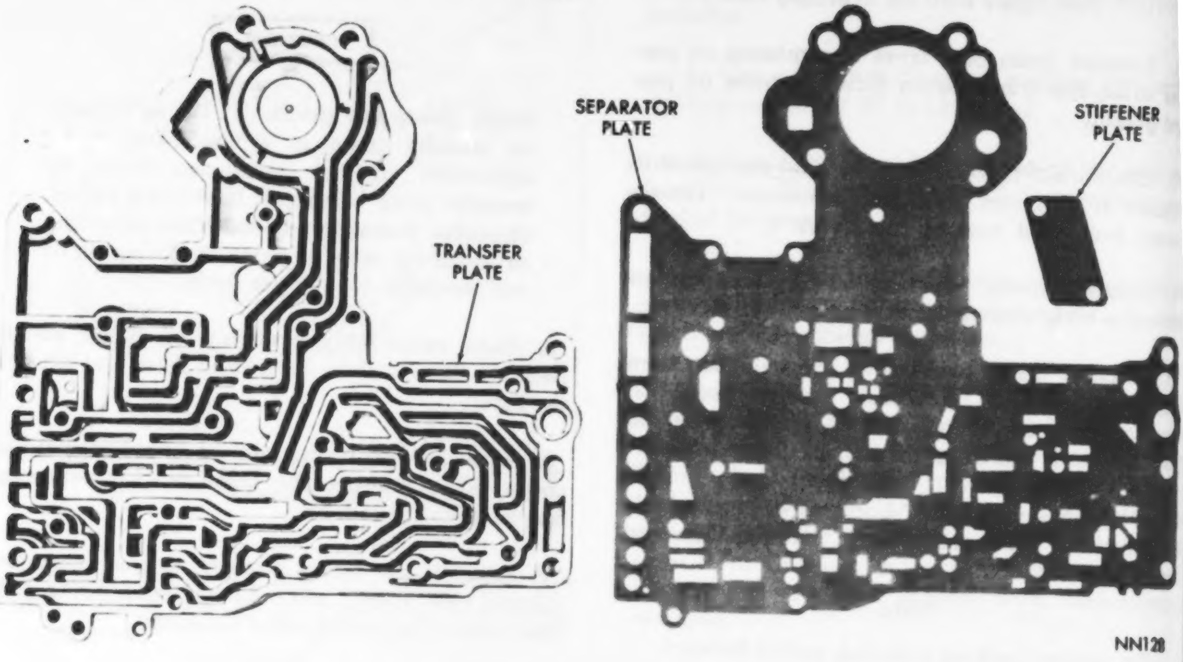


Figure 5-89. Transfer and Separator Plate

e. Remove the 17 transfer plate retaining screws. Carefully lift transfer plate and steel separator plate assembly off the valve body. (See figure 5-89.)

f. Invert transfer plate and remove the stiffener plate. Remove remaining screws securing separator plate to the transfer plate, and carefully lift off the separator plate.

g. Note location of the six steel balls in the valve body, one of them is larger than the other five and is in the larger chamber. Remove the steel balls. (See figure 5-90.)

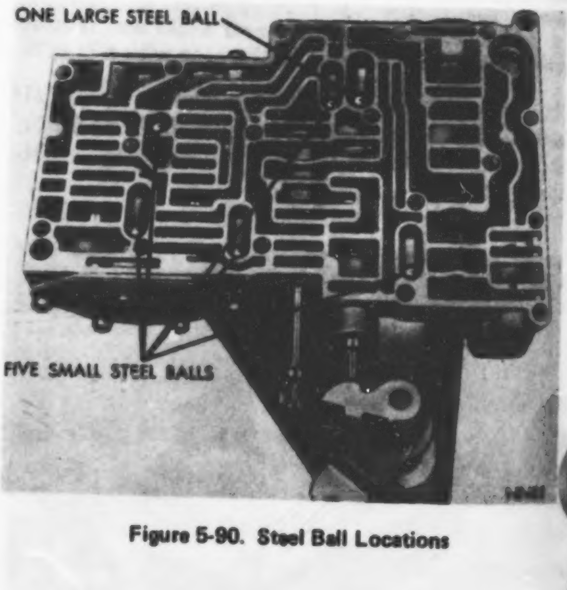


Figure 5-90. Steel Ball Locations

h. Invert valve body and lay it on a clean cloth or paper. Remove E-clip and washer from throttle lever shaft. Remove any burrs from the shaft, then while holding manual lever detent ball and spring in their bore with screwdriver or similar tool, slide manual lever off the throttle shaft. Remove the detent ball and spring. (See figure 5-91.)

i. Remove manual valve, carefully slide it out of the valve body with a rotating motion.

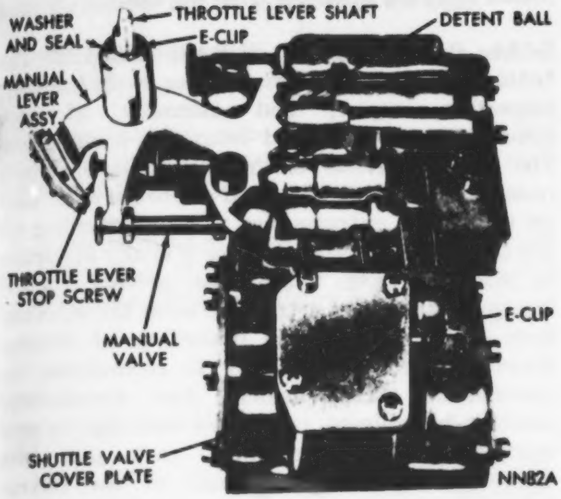

WASHER AND SEAL
THROTTLE LEVER SHAFT
E-CLIP
DETENT BALL
MANUAL LEVER ASSY
THROTTLE LEVER STOP SCREW
MANUAL VALVE
E-CLIP
SHUTTLE VALVE COVER PLATE
NN82A

Figure 5-91. Valve Body Controls

j. Remove throttle lever and shaft from the valve body.

k. Remove shuttle valve cover plate. Remove E-clip from the exposed end of the shuttle valve.

l. Remove throttle lever stop screw assembly, being careful not to disturb setting any more than is necessary.

m. Remove kickdown detent, kickdown valve, throttle valve spring and the throttle valve.

n. Remove governor plug end plate. Tip up valve body to allow shuttle valve throttle plug, spring, shuttle valve, and shift valve governor plugs to slide out into your hand.

Note

Note longer stem on the 1-2 shift valve plug as a means for identification.

o. Remove shift valve end plate and slide out the two springs and valves.

p. Remove regulator valve end plate. Slide regulator valve line pressure plug, sleeve, and regulator valve throttle pressure plug out of the valve body.

5-152. OIL PUMP AND REACTION SHAFT SUPPORT. (See figure 6-48.)

a. Remove bolts from rear side of reaction shaft support, remove vent baffle and lift support off the pump.

b. Remove rubber seal ring from the pump body flange.

c. Drive out the oil seal with a blunt punch or puller tool. (See figure 5-92.)

5-153. BANDS, CLUTCHES, AND SERVOS (REMOVAL).

a. Kickdown Band and Front Clutch

1. Loosen front band adjuster, remove band strut and slide band out of the case.

2. Slide front clutch assembly out of the case.

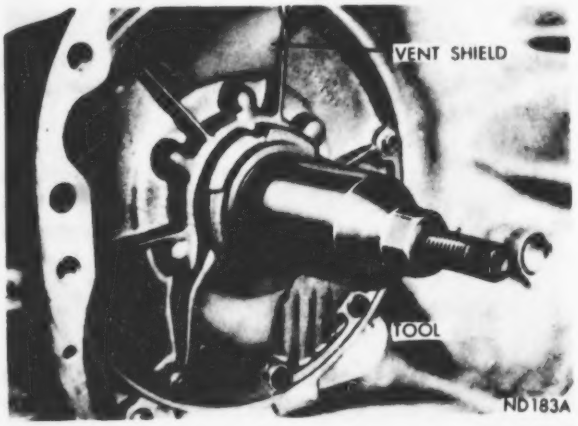

VENT SHIELD
TOOL
ND183A

Figure 5-92. Removing Pump Oil Seal

b. Input Shaft and Rear Clutch.

1. Grasp input shaft, and slide shaft and rear clutch assembly out of the case.

CAUTION

Be careful not to lose the thrust washer located between rear end of input shaft and forward end of output shaft.

c. Planetary Gear Assemblies, Sun Gear, and Driving Shell

1. While supporting output shaft and driving shell, carefully slide assembly forward and out through the case.

CAUTION

Be careful not to damage ground surfaces on output shaft during removal.

d. Rear Band and Low-Reverse Drum

1. Remove low-reverse drum, then loosen rear band adjuster, remove band strut and then remove band from the case.

e. Overrunning Clutch

1. Note position of overrunning clutch rollers and springs before disassembly to assist in reassembly.

2. Carefully slide out clutch hub and remove the rollers and springs. If overrunning clutch cam and/or roller spring retainer are found damaged or worn, replace both parts.

f. Kickdown Servo

1. Compress kickdown servo spring by using engine valve spring compressor, then remove the snap ring.

2. Remove rod guide, springs and piston rod from the case. Be careful not to damage piston rod or guide during removal.

3. Insert magnetic tool inside piston and withdraw piston from the transmission case.

g. Low and Reverse Servo

1. Compress low and reverse servo piston spring by using engine valve spring compressor, then remove the snap ring.

2. Remove spring retainer, spring, and servo piston and plug assembly from the case.

5-154. RECONDITION SUBASSEMBLIES. The following procedures cover disassembly, inspection, repair, and assembly of each sub-assembly as removed from the transmission. The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on valves, use extreme care to avoid rounding off the sharp edges. The sharp edge is vitally important to this type valve. Sharp edges prevent dirt and foreign matter from getting between the valve and body, thus reducing the possibility of sticking. When it becomes necessary to recondition the transmission, and vehicle has accumulated considerable mileage, install new seal rings on parts requiring their usage. Coat each part with Automatic Transmission Fluid of the Dexron Type.

5-155. REACTION SHAFT AND OIL PUMP. (See figure 6-48.)

a. Inspect and replace the threaded bushing in the oil pump housing if required.

b. Inspect and replace the threaded bushing in the reaction shaft support if required.

CAUTION

Do not clamp any part of reaction shaft or support in a vise.

c. Inspect the interlocking seal rings on the reaction shaft support for wear or broken locks, make sure they turn freely in the grooves. Do not remove rings unless conditions warrant. Inspect pump body and reaction shaft support bushings for wear or scores. Inspect machined surfaces on pump body and reaction shaft support for nicks and burrs. Inspect pump rotors for scoring or pitting. With rotors cleaned and installed in the pump body, place a straight edge across face of the rotors and pump body. Using a feeler gauge, measure the clearance between straight edge and face of the rotors. Clearance limits are from .0015 to .0030 inch. Also, with a feeler gauge, measure rotor tip clearance between the inner and outer rotor teeth. Clearance limits are from .007 to .012 inch.

d. If pump housing bushing needs replacement, place pump housing on a clean smooth surface with the rotor cavity facing down.

e. Drive bushing straight down and out of the bore. Be careful not to cock tool in the bore.

f. With pump housing on a smooth clean surface (hub end down), start bushing in the bushing bore.

g. Drive bushing into the housing until tool bottoms in the pump cavity. Be careful not to cock tool during installation.

h. Stake bushing in place by using a blunt punch or similar tool. A gentle tap at each stake slot location will suffice. (See figure 5-93.)

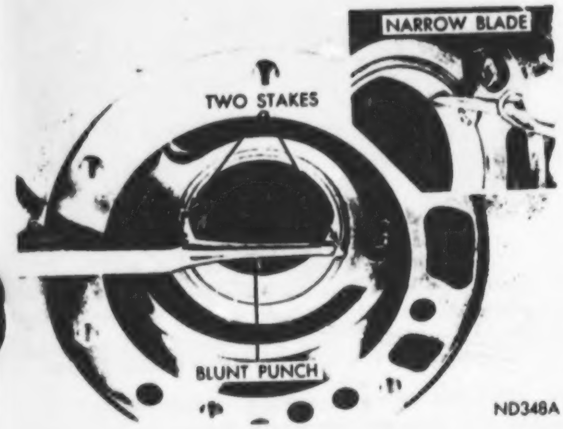


Figure 5-93. Staking Pump Bushing

i. Using a narrow-bladed knife or similar tool, remove high points or burrs around the staked area. Do not use a file or similar tool that will remove more metal than is necessary.

j. Thoroughly clean pump housing before installation.

k. Thoroughly clean reaction shaft support assembly before installation.

l. Assemble pump rotors in the pump housing,

m. Install reaction shaft support and position vent baffle over the vent opening. Install retaining bolts and tighten to 150 inch-pounds.

n. Place a new oil seal in opening of the pump housing (lip of seal facing inward). Using pilot arbor, drive seal into housing until tool bottoms.

5-156. FRONT CLUTCH. (See figure 6-45.)

a. Disassembly.

1. Remove large selective snap ring that secures pressure plate in the clutch piston retainer. Lift pressure plate and clutch plates out of the retainer.

2. Install compressor over piston spring retainer. Compress springs and remove snap ring, then slowly release tool until spring retainer is free of the hub. Remove tool, retainer and springs. (See figure 5-94.)

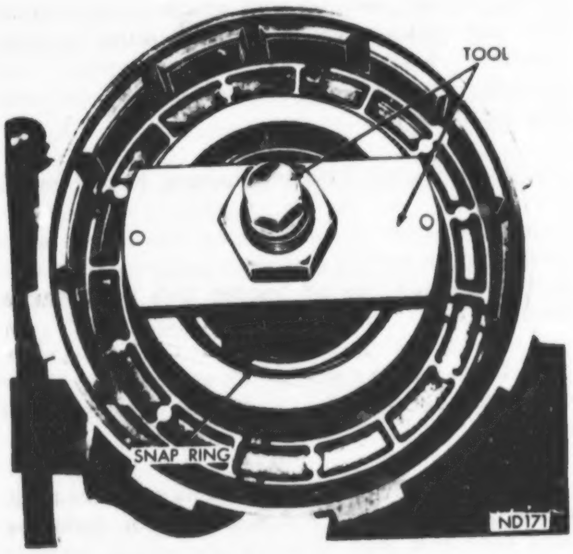


Figure 5-94. Removing Front Clutch Spring Retainer Snap Ring

3. Invert clutch retainer assembly and bump on a wood block to remove the piston. Remove seals from the piston and clutch retainer hub.

b. Inspection.

1. Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

2. Inspect steel plate lug grooves in the clutch retainer for smooth surfaces, plates must travel freely in the grooves. Inspect band contacting surface on the clutch retainer for scores. Note ball check in clutch retainer, make sure ball moves freely. Inspect seal surfaces in the clutch retainer for nicks or deep scratches, light scratches will not interfere with sealing of neoprene rings. Inspect clutch retainer bushing for wear or scores.

3. Inspect inside bore of the piston for score marks. If light, remove with crocus cloth. Inspect the seal grooves for nicks and burrs. Inspect neoprene seals for deterioration, wear, and hardness, and the piston springs, retainer and snap ring for distortion.

c. Front Clutch Retainer Bushing Replacement.

1. Lay clutch retainer (open end down) on a clean smooth surface and place removing head tool in the bushing. Install handle tool in removing head.

2. Drive bushing straight down and out of the clutch retainer bore. Be careful not to cock tool in the bore.

3. Lay clutch retainer (open end up) on a clean smooth surface. Slide a new bushing on installing head tool and start them in the clutch retainer bore.

4. Install handle tool in the installer. Drive bushing into the clutch retainer until tool bottoms.

5. Thoroughly clean clutch retainer before assembly and installation.

d. Assembly.

1. Lubricate and install inner seal on hub of the clutch retainer. Make sure lip of seal faces down and is properly seated in the groove.

2. Install outer seal on clutch piston, with lip seal toward bottom of the clutch retainer. Apply coating of wax type lubricant or graphite to oute edge of the seals for easier installation of the pisto assembly. Place piston assembly in retainer carefully seat piston in bottom of the retainer.

3. Place 8 springs on clutch piston hub exactly as removed. Position spring retainer and snap ring on the springs. Compress springs with tool, and seat snap ring in the hub groove. Remov compressor tool. (See figure 5-95.)

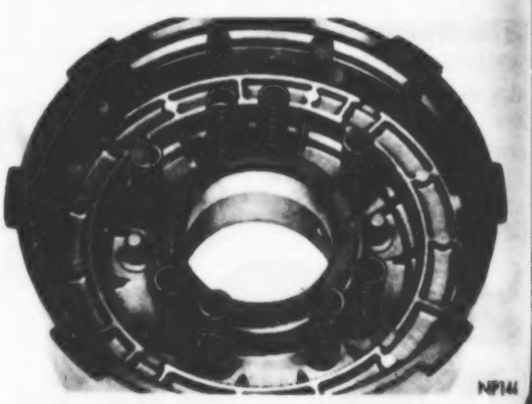

NP144

Figure 5-95. Front Clutch Piston Return Springs

4. Lubricate all clutch plates, install one steel plate followed by a lined plate until all plates are installed. Install pressure plate and selective snap ring. Make sure snap ring is properly seated.

5. With front clutch completely assembled, insert a feeler gauge between pressure plate and snap ring. The clearance should be .024 to .123 inch. If not, install a snap ring of proper thickness to obtain specified clearance. Snap rings are the same as that used in the rear clutch and are available in .060 to .062, .074 to .076 and .088 to .090 inch thickness. (See figure 5-96.)

5-157. REAR CLUTCH.

a. Disassembly. Figure 6-46 shows a disassembled view of the rear clutch assembly.

1. Remove large selective snap ring that secures pressure plate in the clutch retainer. Lift pressure plate, clutch plates, and inner pressure plate out of the retainer.

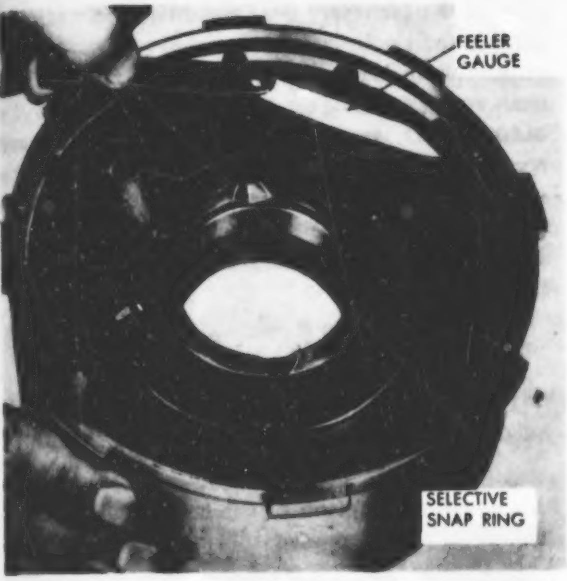


Figure 5-96. Measuring Front Clutch Plate Clearance

2. Carefully pry one end of the wave spring out of its groove in the clutch retainer, then remove wave spring, spacer ring and clutch piston spring.

3. Invert clutch piston retainer assembly and bump on a wood block to remove the piston. Remove seals from the piston.

4. If necessary, remove snap ring and press input shaft from the clutch piston retainer.

b. Inspection.

1. Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

2. Inspect steel plate lug grooves in the clutch retainer for smooth surfaces, plates must travel freely in grooves. Note ball check in the piston, make sure ball moves freely. Inspect seal surfaces in the clutch retainer for nicks or deep scratches, light scratches will not interfere with sealing of neoprene seals. Inspect neoprene seals for deterioration, wear, and hardness. Inspect piston spring, wave spring, and spacer for distortion or breakage.

3. Inspect interlocking seal rings on the input shaft for wear or broken locks, make sure they turn freely in the grooves. Do not remove rings unless conditions warrant. Inspect bushing in the input shaft for wear or scores. Inspect rear clutch to front clutch thrust washer for wear. Washer thickness should be 0.061 to 0.063 inch, replace if necessary.

c. Input Shaft Bushing Replacement.

1. Clamp input shaft in a vise with soft jaws, being careful not to clamp on the seal ring lands or journals.

2. Use a bushing remover tool to pull the threaded bushing from the input shaft.

3. Thoroughly clean input shaft to remove chips made by the remover threads. Make certain small lubrication hole next to ball in end of the shaft is not plugged with chips. Be sure no chips are lodged next to the steel ball.

4. Stand input shaft upright on a clean, smooth surface. Using a pilot arbor, drive new bushing into the input shaft.

5. Thoroughly clean input shaft and clutch piston retainer before assembly and installation.

d. Assembly.

1. If removed, press input shaft into the clutch piston retainer and install snap ring.

2. Lubricate and install inner and outer seal rings on the clutch piston. Make sure lip of seals face toward head of clutch retainer, and are properly seated in the piston grooves.

3. Place piston assembly in the retainer and, with a twisting motion, seat piston in bottom of the retainer.

4. Position clutch retainer over the piston retainer splines and support assembly so the clutch retainer remains in place.

5. Place clutch piston spring and spacer ring on top of piston in the clutch retainer, make sure spring and spacer ring are positioned in the retainer recess. Start one end of wave spring in the retainer groove, then progressively push or tap spring into place making sure it is fully seated in the groove. (See figure 5-97.)

6. Install inner pressure plate in clutch retainer with raised portion of plate resting on the spring.

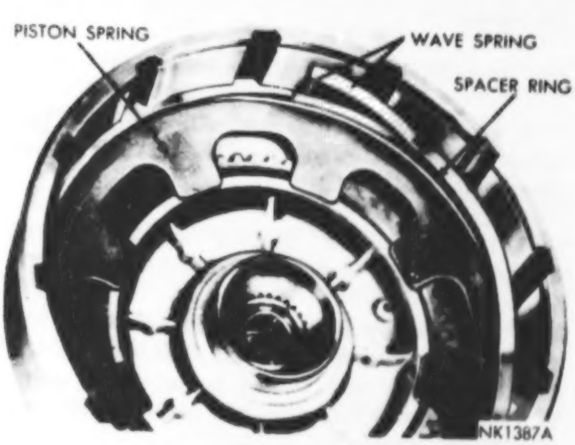


Figure 5-97. Installing Rear Clutch Spring, Spacer Ring and Wave Spring

7. Lubricate all clutch plates, install one lined plate followed by a steel plate until all plates are installed. Install the outer pressure plate and selective snap ring.

8. Measure rear clutch plate clearance by having an assistant press downward firmly on the outer pressure plate, then insert a feeler gauge between plate and snap ring. The clearance should be between 0.037 to 0.060 inch. If not, install a snap ring of proper thickness to obtain specified clearance. Low limit clearance is desirable. Rear clutch plate clearance is very important in obtaining proper clutch operation. The clearance can be adjusted by the use of various thickness outer snap rings. Snap rings are available in 0.060 to 0.062, 0.074 to 0.076, 0.088 to 0.090 and 0.106 to 0.108 inch thickness.

5-158. PLANETARY GEAR TRAIN AN DRIVING SHELL. (See figure 6-47.) Measure en play of the planetary gear assemblies, sun gear an driving shell before removing these parts from th output shaft. With assembly in an upright positio push rear annulus gear support downward on th output shaft. Insert a feeler gauge between re annulus gear support hub and shoulder on th output shaft. The clearance should be 0.010 to 0.039 inch. If clearance exceeds specification, replace thrust washers and/or necessary parts. (Se figure 5-98.)

a. Disassembly.

1. Remove thrust washer from forward end of output shaft.

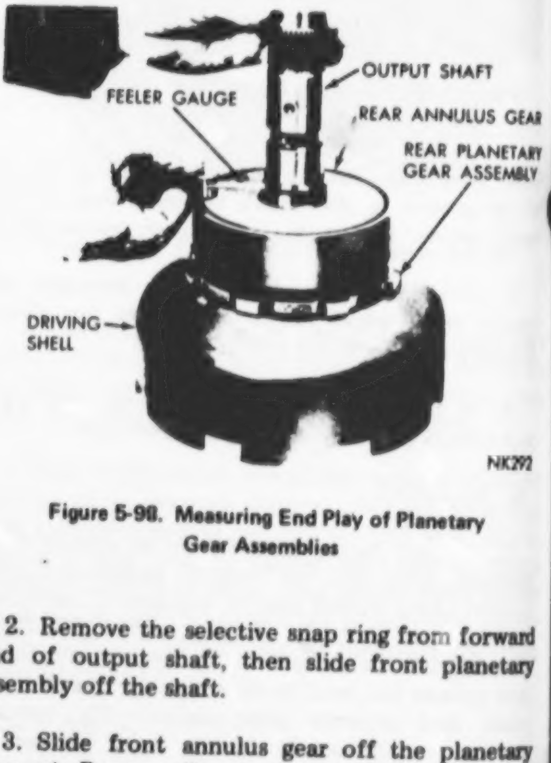


Figure 5-98. Measuring End Play of Planetary Gear Assemblies

2. Remove the selective snap ring from forward end of output shaft, then slide front planetary assembly off the shaft.

3. Slide front annulus gear off the planetary gear set. Remove thrust washer from rear side of planetary gear set.

4. Slide sun gear, driving shell and rear planetary assembly off the output shaft.

5. Lift sun gear and driving shell off rear planetary gear assembly. Remove thrust washer from inside the driving shell. Remove snap ring and steel washer from the sun gear (rear side of driving shell) and slide sun gear out of the shell. Remove front snap ring from sun gear if necessary. Note that front end of the sun gear is longer than the rear.

6. Remove thrust washer from forward side of rear planetary gear assembly, remove planetary gear set and thrust plate from the rear annulus gear.

b. Inspection.

1. Inspect bearing surfaces on output shaft for nicks, burrs, scores or other damage. Light scratches, small nicks or burrs can be removed with crocus cloth or a fine stone. Inspect speedometer drive gear for any nicks or burrs, and remove with a sharp edged stone. Make sure all oil passages in the shaft are open and clean.

2. Inspect bushings in sun gear for wear or scores, replace sun gear assembly if bushings are damaged. Inspect all thrust washers for wear and scores, replace if damaged or worn below specifications. Inspect thrust faces of planetary gear carriers for wear, scores or other damage, replace as required. Inspect planetary gear carrier for cracks and pinions for broken or worn gear teeth and for broken pinion shaft lock pins. Inspect annulus gear and driving gear teeth for damage. Replace distorted lock rings.

c. Assembly

1. Install rear annulus gear on the output shaft. Apply a thin coat of grease on the thrust plate, place it on shaft and in annulus gear making sure the teeth are over the shaft splines.

2. Position rear planetary gear assembly in rear annulus gear. Place thrust washer on front side of the planetary gear assembly.

3. Install snap ring in front groove of the sun gear (long end of gear). Insert sun gear through front side of the driving shell, install rear steel washer and snap ring.

4. Carefully slide driving shell and sun gear assembly on the output shaft, engaging sun gear teeth with rear planetary pinion teeth. Place thrust washer inside front of the driving shell.

5. Place thrust washer on rear hub of the front planetary gear set, then slide assembly into the front annulus gear.

6. Carefully work front planetary and annulus gear assembly on output shaft, meshing planetary pinions with the sun gear teeth.

7. With all components properly positioned, install selective snap ring on front end of the output shaft. Re-measure end play of the assembly.

Note

The end play can be adjusted by the use of various thickness snap rings. Snap rings are available in 0.048 to 0.052, 0.055 to 0.059 and 0.062 to 0.066 inch thickness.

5-159. OVERRUNNING CLUTCH.

a. Inspection. Inspect clutch rollers for smooth round surfaces, they must be free of flat spots and chipping edges. Inspect roller contacting surfaces in the cam and race for brinelling. Inspect roller springs for distortion, wear or other damage. Inspect cam set screw for tightness. If loose, tighten and restake the case around the screw.

b. Overrunning Clutch Cam Replacement. If overrunning clutch cam and/or roller spring retainer are found damaged, replace cam and spring retainer in the following manner:

1. Remove set screw from the case below clutch cam.

2. Remove four bolts securing output shaft support to rear of the transmission case. Insert a punch through bolt holes and drive cam from the case. Alternate punch from one bolt hole to another so cam will be driven evenly from the case. (See figure 5-99.)

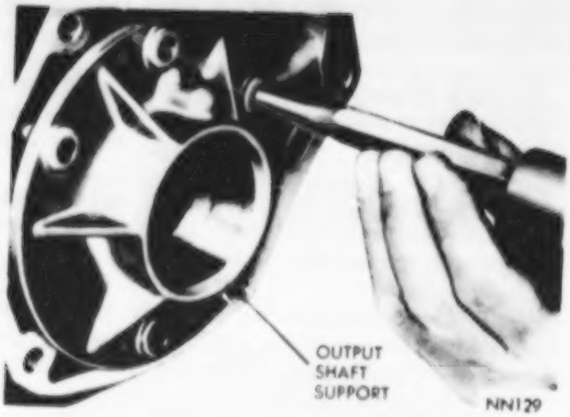


Figure 5-99. Removing Overrunning Clutch Cam

Note

The output shaft support must be in the case to install overrunning clutch cam. If the support requires replacement, drive it rearward out of the case with a wood block and hammer. To install, screw two pilot studs into the case. Chill the support with ice (preferably dry ice). Quickly position support over the pilot studs, and drive it firmly into the case with wood block and hammer. (See figure 5-100.)

3. Clean all burrs and chips from cam area in the case.

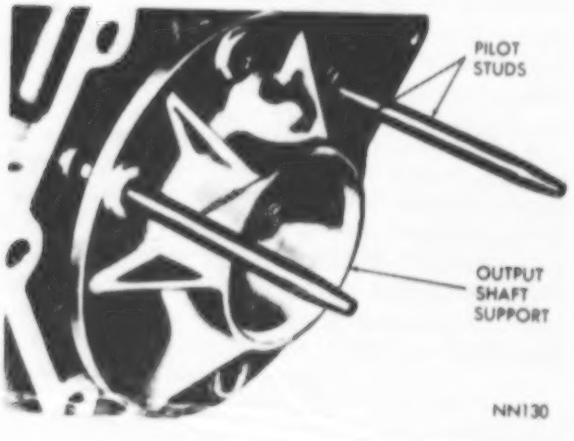


Figure 5-100. Installing Output Shaft Support

4. Place spring retainer on the cam, making retainer lugs snap firmly into the notches on cam.

5. Position cam in the case with cam serrati aligned with those in the case. Tap cam evenly i case as far as possible with a soft mallet. (See fi 5-101.)

6. Make sure cam is firmly bottomed, th install cam retained set screw. Stake case arou set screw to prevent it coming loose.

7. Remove cam installing tool. Install a tighten support retaining screws to 1 inch-pounds. Stake case around cam in six plac with a blunt chisel. (See figure 5-102.)

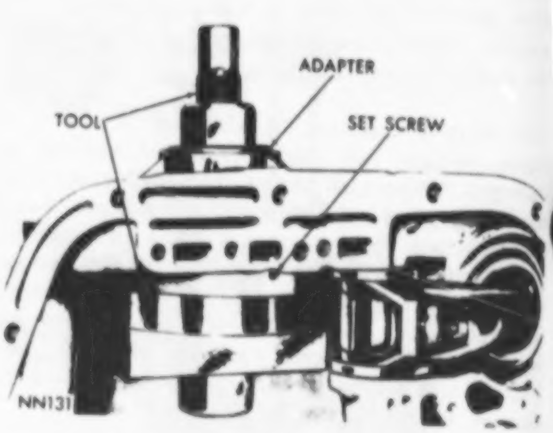


Figure 5-101. Installing Overrunning Clutch Cam

5-160. KICKDOWN SERVO AND BAND INSPECTION.

a. Figure 5-103 shows a disassembled view of the kickdown servo assembly.

b. Inspect piston and guide seal rings for wear, and make sure they turn freely in the grooves. It is not necessary to remove seal rings unless conditions warrant. Inspect piston for nicks, burrs scores and wear, and piston bore in case for scores or other damage. Inspect fit of the guide on piston rod, and piston spring for distortion.

c. Inspect band lining for wear and bond of lining to the band and lining for black burn marks,

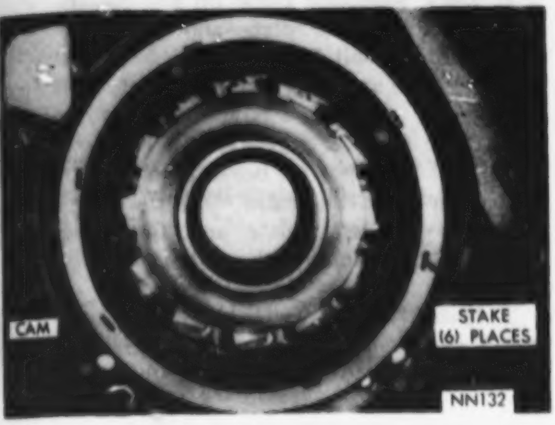

CAM
STAKE (6) PLACES
NN132

Figure 5-102. Cam Stake Locations

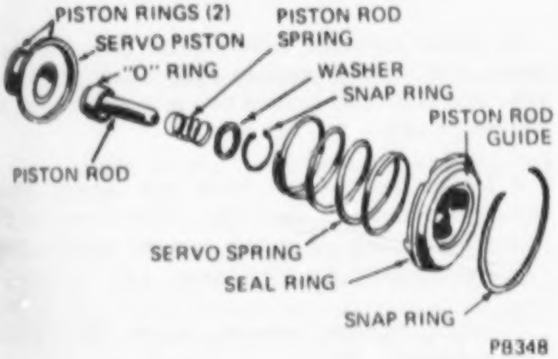

PISTON RINGS (2)
SERVO PISTON
"O" RING
PISTON ROD SPRING
WASHER
SNAP RING
PISTON ROD GUIDE
PISTON ROD
SERVO SPRING
SEAL RING
SNAP RING
PB348

Figure 5-103. Kickdown Servo (Controlled Load)

glazing, non-uniform wear pattern and flaking. If lining is worn so grooves are not visible at ends or any portion of the band, replace band. Inspect band for distortion or cracked ends.

5-161. LOW-REVERSE SERVO AND BAND.

a. Disassembly (see figure 5-104).

1. Remove snap ring from piston plug and remove plug and spring from piston.

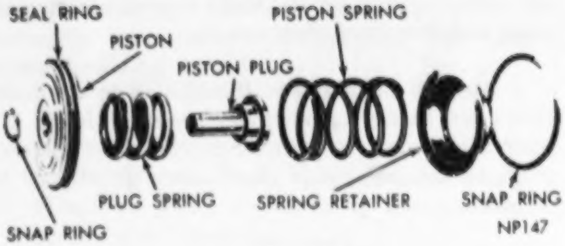

SEAL RING
PISTON
PISTON SPRING
PISTON PLUG
PLUG SPRING
SPRING RETAINER
SNAP RING
SNAP RING
NP147

Figure 5-104. Low and Reverse Servo

b. Inspection. Inspect seal for deterioration, wear and hardness and inspect piston and piston plug for nicks, burrs, scores and wear; piston plug must operate freely in the piston. Inspect piston bore in the case for scores or other damage and springs for distortion. Inspect band lining for wear and bond of lining to the band. If lining is worn so grooves are not visible at ends or any portion of the band, replace band. Inspect band for distortion or cracked ends.

c. Assembly.

1. Install piston plug and spring in the piston and secure with snap ring.

5-162. GOVERNOR. (See figure 6-44.)

a. Inspect all parts for burrs and wear. Inspect inner weight for free movement in the outer weight, and outer weight for free movement in the governor body. Inspect valve for free movement in the governor body. The weights and valve should fall freely in the bores when clean and dry. Rough surfaces may be removed with crocus cloth.

b. Inspect the governor weight spring for distortion. Inspect lugs on the parking gear for broken edges or other damage. Thoroughly clean all governor parts in clean solvent and inspect for free movement before assembly.

c. Assembly.

1. If support was separated from the governor body, assemble and tighten the bolts finger tight.

2. Assemble governor weights and spring, and secure with snap ring inside of the large governor weight. Place weight assembly in the governor body and install snap ring.

5-163. VALVE BODY AND ACCUMULATOR PISTON.

a. Cleaning and Inspection.

1. Allow all parts to soak a few minutes in a suitable clean solvent. Wash thoroughly and blow dry with compressed air. Make sure all passages are clean and free from obstructions.

2. Inspect manual and throttle valve operating levers and shafts for being bent, worn or loose. If a lever is loose on its shaft, it may be silver soldered only, or the lever and shaft assembly should be replaced.

CAUTION

Do not attempt to straighten bent levers.

3. Inspect all mating surfaces for burrs, nicks and scratches. Minor blemishes may be removed with crocus cloth, using only a very light pressure. Using straight edge, inspect all mating surfaces for warpage or distortion. Slight distortion may be corrected, using a surface plate. Make sure all metering holes in steel plate are open. Using a pen light, inspect bores in valve body for scores, scratches, pits and irregularities.

4. Inspect all valve springs for distortion and collapsed coils. Inspect all valves and plugs for burrs, nicks and scores. Small nicks and scores may be removed with crocus cloth, providing extreme care is taken not to round off sharp edges. The sharpness of these edges is vitally important because it prevents foreign matter from lodging between valve and valve body, thus reducing possibility of sticking. Inspect all valves and plugs for freedom of operation in valve body bores. When bores, valves and plugs are clean and dry, the valve and plugs should fall freely in the bores. The valve body bores do not change dimensionally with use. Therefore, a valve body that was functioning properly when vehicle was new, will operate correctly if it is properly and thoroughly cleaned. There is no need to replace the valve body unless it is damaged in handling.

5. Inspect the two seal rings on the accumulator piston for wear and make sure they turn freely in piston grooves. It is not necessary to remove rings unless condition warrants. Inspect piston for nicks, burrs, scores and wear. Inspect piston bore in the case for scores or other damage and piston spring for distortion. Replace parts as required.

b. Assembly (see figure 6-41).

1. Place separator plate on the transfer plate. Install the stiffener plate and retaining screws. Make sure all bolt holes are aligned, then tighten stiffener plate screw to 28 inch-pounds.

2. Place the 1-2 and 2-3 shift valve governor plugs in their respective bores. Install shuttle valve, spring and shuttle valve throttle plug. Install governor plug end plate and tighten the five retaining screws to 28 inch-pounds.

3. Install E-clip on end of the shuttle valve. Install shuttle valve cover plate and tighten four retaining screws to 28 inch-pounds.

4. Install the 1-2 and 2-3 shift valves and springs. Install shift valve end plate and tighten three retaining screws to 28 inch-pounds.

5. Install regulator valve throttle pressure plug, sleeve, and the line pressure plug. Install regulator valve end plate and tighten two retaining screws to 28 inch-pounds.

6. Install the throttle valve and spring. Slide kickdown detent on the kickdown valve (counterbore side of detent toward valve), then install assembly in the valve body.

7. Install throttle lever stop screw, and tighten lock nut finger tight.

8. Install manual valve in the valve body.

9. Install throttle lever and shaft on the valve body. Insert detent spring and ball in its bore in the valve body. Depress ball and spring with screwdriver or similar tool and slide manual lever over throttle shaft so that it engages the manual valve and detent ball. Install seal retaining washer and E-clip on the throttle shaft. (See figure 5-105.)

10. Position valve body assembly on the repair stand.

11. Place the six steel balls in the valve body chambers with large ball in the large chamber.

12. Position transfer plate assembly on the valve body. Install the 17 retaining screws, starting at the

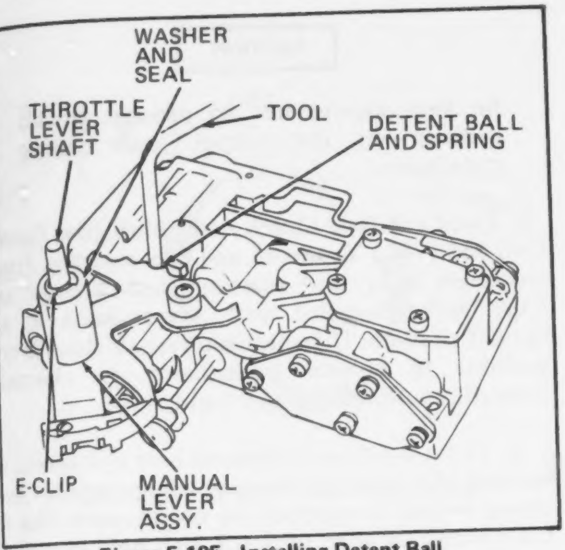


Figure 5-105. Installing Detent Ball, Spring and Control Levers

center and working outward, tighten screws to 28 inch-pounds.

13. Install torque converter valve and regulator valve.

14. Position torque converter valve spring and regulator valve spring over ends of their respective valves. Place line pressure adjusting screw assembly on end of the regulator valve spring with long dimension of nut at right angles to valve body.

15. Install the spring retainer, making sure converter valve spring is engaged on the tang and position squarely in the retainer. Tighten three retaining screws to 28 inch-pounds.

16. Measure and, if necessary, align spring retainer.

17. Install oil filter and tighten three retaining screws to 28 inch-pounds.

18. After valve body has been serviced and completely assembled, adjust throttle and line pressures. However, if pressures were satisfactory prior to disassembly, use original settings.

5-164. ASSEMBLY — SUB-ASSEMBLY INSTALLATION. The assembly procedures given here include installation of sub-assemblies in the transmission case and adjusting drive train end play. Do not use force to assemble mating parts. If parts do not assemble freely, investigate cause, and correct trouble before proceeding with the assembly procedures. Always use new gasket during assembly operations.

Note

> Use only Automatic Transmission Fluid (Dextron type), to lubricate transmission parts during assembly.

a. Overrunning Clutch (see figure 5-106).

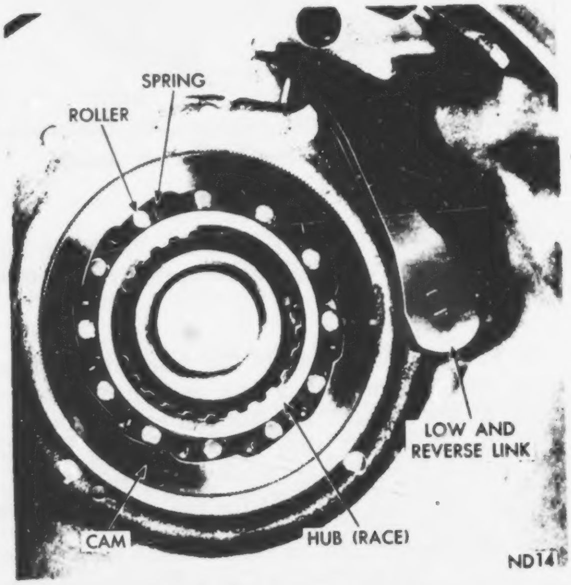


Figure 5-106. Overrunning Clutch, Low and Reverse Band Link

1. With transmission case in an upright position, insert clutch race inside the cam. Install overrunning clutch rollers and springs exactly as they were removed.

b. Low-Reverse Servo and Band (see figure 5-107).

1. Carefully work servo piston assembly into the case with a twisting motion. Place spring, retainer and snap ring over the piston.

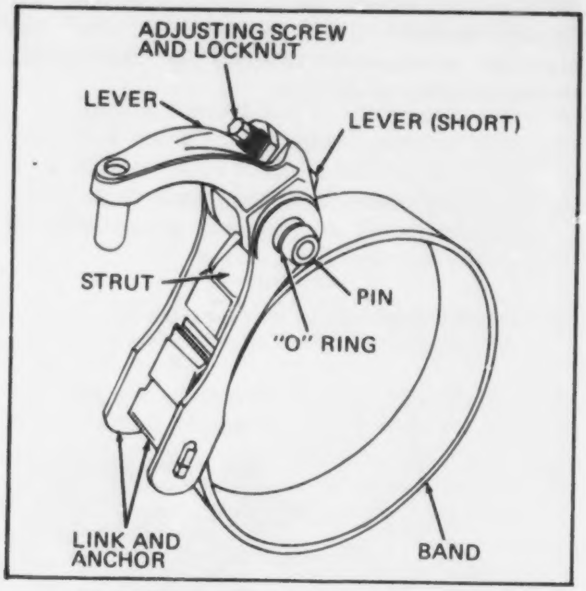


Figure 5-107. Low-Reverse Band and Linkage

2. Compress low and reverse servo piston spring by using engine valve spring compressor tool, then install snap ring.

3. Position rear band in the case, install short strut, then connect long link and anchor to the band. Screw in band adjuster just enough to hold strut in place. Be sure long link and anchor assembly is installed, as shown in figure 5-107, to provide a running clearance for the low and reverse drum. Install low-reverse drum.

c. Kickdown Servo (see figure 5-103).

1. Carefully push servo piston into the case bore. Install piston rod, two springs and the guide.

2. Compress kickdown servo springs by using engine valve spring compressor tool, then install snap ring.

d. Planetary Gear Assemblies, Sun Gear and Driving Shell. (See figure 6-47.) While supporting assembly in the case, insert output shaft through rear support. Carefully work assembly rearward engaging rear planetary carrier lugs into the low-reverse drum slot.

CAUTION

Be very careful not to damage ground surfaces on the output shaft during installation.

e. Front and Rear Clutch Assemblies. (See figur 6-45 and 6-46.) The front and rear clutches, fro band, oil pump and reaction shaft support a more easily installed with transmission in a upright position. If transmission repair stand is no available to support transmission, an alternat method is outlined in Steps 1 and 2.

1. Cut a 3-1/2 inch diameter hole in a bench, in the end of a small oil drum or a large wooden box strong enough to support the transmission. Cut or file notches at edge of 3-1/2 inch hole so output shaft support will fit and lay flat in the hole.

2. Carefully insert output shaft into the hole to support transmission upright, with its weight resting on flange of output shaft support.

3. Apply a coat of grease on input to output shaft thrust washer, and install washer on front end of the output shaft.

4. Align front clutch plate inner splines, and place assembly in position on the rear clutch. Make sure front clutch plate splines are fully engaged on rear clutch splines.

5. Align rear clutch plate inner splines, grasp input shaft and lower the two clutch assemblies into transmission case.

6. Carefully work clutch assemblies in a circular motion to engage rear clutch splines over splines of front annulus gear. Make sure front clutch drive lugs are fully engaged in slots in the driving shell.

f. Front Band. Figure 5-108 shows a disassembled view of the kickdown band assembly.

1. Slide band over front clutch assembly.

2. Install band strut, screw in adjuster just enough to hold strut and anchor in place.

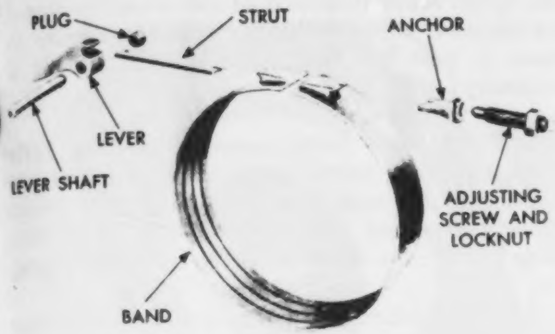


Figure 5-108. Kickdown Band and Linkage

g. Oil Pump and Reaction Shaft Support. If difficulty was encountered in removing oil pump assembly due to an exceptionally tight fit in the case, it may be necessary to expand the case with heat during pump installation. Using a suitable heat lamp, heat case in the area of pump for a few minutes prior to installing pump and reaction shaft support assembly.

h. If drive train end play was not within specifications (0.034 to 0.084 inch) when measured, replace thrust washer on reaction shaft support hub with one of proper thickness. The following selective thrust washers are available:

Thickness	Color
0.061 to 0.063 inch	Green
0.084 to 0.086 inch	Red
0.102 to 0.104 inch	Yellow

1. Screw two pilot studs, in the case. Install a new gasket over the pilot studs. See figure 5-109.

2. Place a new rubber seal ring in groove on outer flange of pump housing. Make sure seal ring is not twisted. Coat seal ring with grease for easy installation.

3. Install pump assembly in the case, tap it lightly with a soft mallet if necessary. Place the deflector over vent opening and install four pump body bolts. Remove pilot studs, install remaining bolts and snug all bolts down evenly.

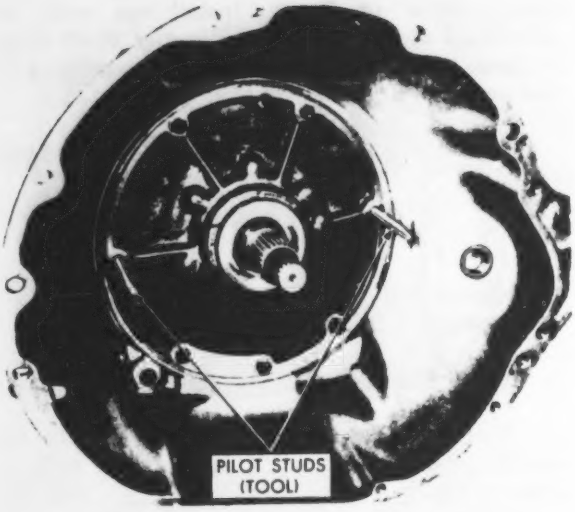


Figure 5-109. Installing Pump and Reaction Shaft Support Assembly

Rotate input and output shafts to see if any binding exists, then tighten bolts to 150 inch-pounds. Check shafts again for free rotation.

i. Governor and Support. (See figure 5-85.)

1. Position support and governor body assembly on the output shaft. Align assembly so governor valve shaft hole in governor body aligns with hole in the output shaft, then slide assembly into place. Install snap ring behind the governor body. Tighten housing to support bolts to 100 inch-pounds. Bend ends of lock straps against bolt heads.

2. Place governor valve on the valve shaft, insert assembly into body and through the governor weights. Install valve shaft retaining snap ring.

j. Extension Housing.

1. Using a new gasket, carefully slide extension housing into place. Install retaining bolts and washers, tighten bolts to 24 foot-pounds.

2. Assemble and install parking brake.

3. Install parking brake drum or transmission flange, position washer with its three projections toward drum or flange. Install nut with its convoluted surface toward the washer. Hold drum or flange with large wrench, and tighten nut to 175 foot-pounds.

4. Install speedometer plug and seal assembly.

Note

Measure drive train end play as described in paragraph 5-143. Correct if necessary.

k. Output Shaft Bearing and Extension Housing.

1. Install a snap ring in the innermost groove on output shaft. Install bearing on the shaft with its outer race ring groove toward the front. Press or tap bearing tight against front snap ring, then install rear snap ring.

2. Place a new extension housing gasket on the transmission case. Position output shaft bearing retaining snap ring in the extension housing. Spread snap ring as far as possible, then carefully tap extension housing into place. Make sure snap ring is fully seated in the bearing groove.

3. Install and tighten extension housing bolts to 24 foot-pounds.

4. Install gasket, plate and two screws on the bottom of extension housing mounting pad.

5. Install speedometer plug and seal assembly.

Note

Measure drive train end play as described in paragraph 5-143. Correct if necessary.

l. Valve Body Assembly and Accumulator Piston.

1. Clean mating surfaces and inspect for burrs on transmission case and valve body steel plate.

2. Install accumulator piston in transmission case and place piston spring on the accumulator piston.

3. Insert parking lock rod through opening in rear of case with knob positioned against the plug and sprag. Move front end of rod toward center of transmission while exerting rearward pressure to force it past the sprag (rotate output shaft if necessary).

4. Place valve body manual lever in LOW position. Place valve body in its approximate position in the case, connect parking lock rod to manual lever and secure with E-clip. Align valve body in the case, install retaining bolts finger tight.

5. With neutral starting switch installed, place manual valve in the neutral position. Shift valve body if necessary to center neutral finger over the neutral switch plunger. Snug bolts down evenly, then tighten to 100 inch-pounds.

6. Install gearshift lever and tighten clamp bolt. Make sure throttle shaft seal is in place, then install flat washer, lever and tighten clamp bolt.

7. Adjust kickdown, and low-reverse bands as described in Section IV.

8. Install oil pan, using a new gasket. Tighten pan bolts to 150 inch-pounds.

5-165. TRANSMISSION AND CONVERTER INSTALLATION. The transmission and converter must be installed as an assembly; otherwise, the converter drive plate, pump bushing, and oil seal will be damaged. The drive plate will not support a load; therefore, none of the weight of the transmission should be allowed to rest on the plate during installation.

a. Rotate pump rotors with Tool C-3881 (Kelsey-Hayes Co., Detroit, Michigan) until the two small holes in handle of tool are vertical.

b. Carefully slide converter assembly over input shaft and reaction shaft. Make sure converter impeller shaft slots are also vertical and fully engage front pump inner rotor lugs.

c. Inspect for full engagement by placing a straight edge on face of the case. The surface of converter front cover lug should be at least 1/2 inch to rear of the straight edge when converter is pushed all the way into transmission. See figure 5-110.

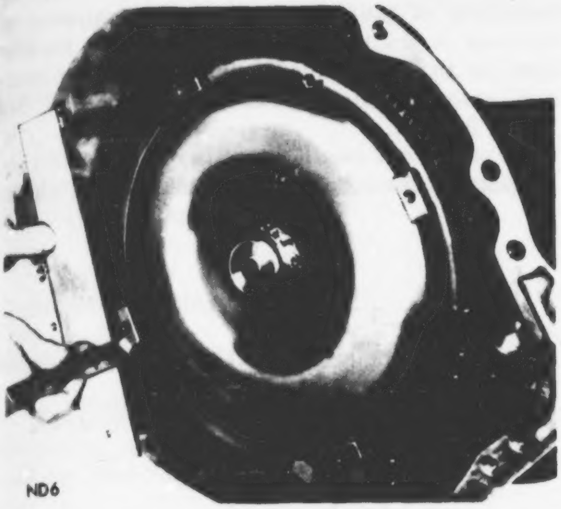


Figure 5-110. Checking Converter for Full Engagement

d. Attach a small "C" clamp to edge of the converter housing to hold converter in place during transmission installation.

e. Inspect converter drive plate for distortion or cracks and replace if necessary.

f. Coat converter hub hole in the crankshaft with wheel bearing lubricant. Place transmission and converter assembly on a service jack and position assembly under vehicle for installation. Raise or tilt as necessary until transmission is aligned with engine.

g. Rotate converter so mark on converter (made during removal) will align with mark on drive plate. The offset holes in plate are located next to the 1/8 inch hole in inner circle of the plate. (See figure 5-111.)

Note

A stamped V mark identifies the offset hole in converter front cover. Carefully work transmission assembly forward over engine block dowels with converter hub entering the crankshaft opening.

h. After transmission is in position, install converter housing bolts and tighten 25 to 30 foot-pounds.

i. Install the two lower drive plates to converter bolts and tighten to 270 inch-pounds.

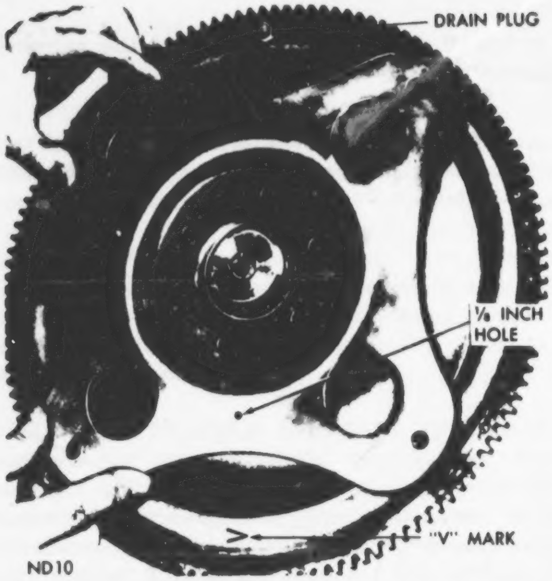


Figure 5-111. Converter and Drive Plate Markings

j. Install starting motor and connect battery ground cable.

k. Rotate engine with the Remote Control Switch and install other two drive plates to converter bolts. Tighten bolts to 270 inch-pounds.

l. Lower transmission so that crossmember is aligned with mounting holes in frame. Install crossmember mounting screws and tighten securely.

m. Remove transmission jack and engine support fixture.

n. Connect parking brake cable as shown in figure 5-82.

o. Connect oil cooler lines to the transmission. Install the oil filler tube.

p. Connect gearshift cable to the transmission case and to the lever.

q. Connect wire to the neutral starting switch.

r. Install cover plate in front of the converter assembly.

s. Refill transmission with Dexron Type Transmission Fluid. Adjust gearshift control and neutral start switch.

t. Attach throttle lever bracket and gearshi cable anchor to case. Adjust throttle lever t obtain a distance of 4-29/32 inches from th centerline of the large bolt to the centerline o the hole in the throttle lever. Secure the thrott lever to the throttle lever bracket at this dimension with 1/4 inch capscrew and locknut. Se Figure 5-112.

u. Install operator's compartment floor plates,

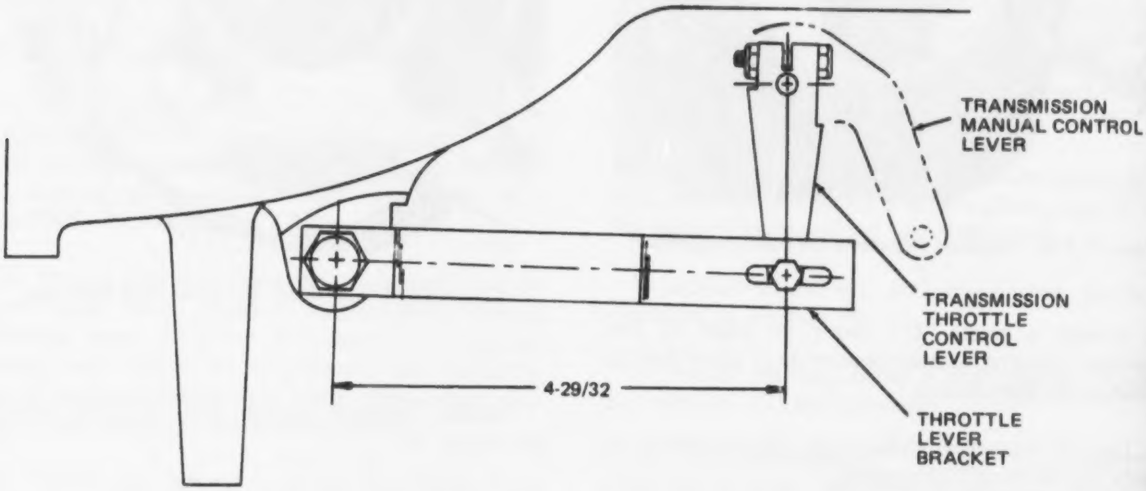

TRANSMISSION MANUAL CONTROL LEVER
TRANSMISSION THROTTLE CONTROL LEVER
THROTTLE LEVER BRACKET
4-29/32

Figure 5-112. Throttle Lever Adjustment

SECTION VI
ILLUSTRATED PARTS BREAKDOWN

-1. GENERAL.

6-2. This Illustrated Parts Breakdown lists and describes the parts for the vehicle and is arranged in the following manner:

Introduction
Group Assembly Parts List

6-3. INTRODUCTION.

6-4. The introduction consists of general information and instructions regarding the use of this Illustrated Parts Breakdown.

6-5. GROUP ASSEMBLY PARTS LIST.

6-6. The Group Assembly Parts List contains a breakdown of the equipment into its assemblies, subassemblies and detail parts. Each assembly listed is followed immediately by its component parts properly indented to show their relationship to the assembly. An assembly listed in column one has its detail parts listed in column two. If a detail part is in turn an assembly, its detail parts are listed in column three, etc. Attaching parts are listed immediately below and at the same indention as the items which they attach. They are captioned (ATTACHING PARTS) and the symbol ---*--- separates them from subsequent listed parts or subassemblies.

6-7. All parts of the equipment are listed except the following:

a. Bulk items, such as electrical wiring or cabling, vinyl tubing, sleeving and lacing cord.

b. Parts which lose their identity by being soldered, brazed, welded, riveted, swaged, cemented, potted, sealed or otherwise permanently fastened to other parts or assemblies and not ubject to disassembly.

6-8. EXPLANATION OF COLUMNS USED IN THE GROUP ASSEMBLY PARTS LIST. The five columns used for the listing of information in the Group Assembly Parts List are explained in the following paragraphs.

6-9. FIGURE AND INDEX NUMBER COLUMN. The figure and index numbers key the parts breakdown list to the applicable illustration. The number preceding the dash is the figure number of the illustration. This figure number appears at the beginning of each page or listing. The number following the dash is the index number of a part appearing in the illustration. The index numbers are arranged in sequence and generally reflect the order of disassembly.

6-10. PART NUMBER COLUMN. This column contains the manufacturer's, part number. Part numbers are used to identify all parts with the exception of commercially obtainable parts (hardware, etc.), parts which do not have a valid part number, or parts which are not serviced as separate pieces, and are available only as part of a higher assembly. The notation "COML," "No Number," or "NSS," respectively, appears in the part number column for these parts

6-11. DESCRIPTION COLUMN. This column identifies the parts being listed by noun name followed by modifiers when applicable. When appropriate, the column also includes descriptive data such as: dimensions, material, applicable government specifications, reference to approved publications for the article, or to previous listing of "Ref" items as explained in paragraph 6-12.

6-12. UNITS PER ASSEMBLY COLUMN. This column indicates the quantity of parts required for the assembly or subassembly in which that part appears. "Ref" (reference) is used in this column when the part has been previously listed, and illustrated, with proper quantity, and is relisted for reference purposes only. The quantities listed in this column are, in the case of assemblies, the total quantity used at the location indicated. In the case of components of assemblies, the quantities listed indicate the number of parts used in one assembly. The quantities specified are not necessarily the total used in the equipment. The designation "N.S.S." denotes parts not procurable as separate items and "AR" denotes that the quantity of parts used is as required.

6-13. USABLE ON CODE COLUMN. Part variations within assemblies are indicated by a letter symbol or combination of symbols appearing in the "Usable on Code" column. Where the "Usable on Code" column is left blank, parts listed are applicable to all models covered by this parts breakdown.

6-14. REPAIR PARTS KITS. This publication reflects the listing of repair parts kits. Certain replacement parts are stocked only in kits. Standard parts and parts having multi-application are stocked in their appropriate classes and may also be stocked in kits. Kit parts should not be ordered from separate stock to make up a kit.

6-15. ABBREVIATIONS. All symbols and abbreviations used in the Group Assembly Parts List are in accordance with Specification MIL-STD-12, Abbreviations for Use on Drawings and in Technical-Type Publications.

6-16. LIST OF MANUFACTURERS' CODES.

6-17. The following list is a compilation of the vendor codes with the names and addresses of suppliers for purchased and vendor parts listed in this publication. The Codes are in accordance with the Federal Supply Codes for Manufacturer's Cataloging Handbook H4-1, and are arranged in numerical order.

CODE	VENDOR'S NAME AND ADDRESS
00779	AMP, Inc. P.O. Box 3608 Harrisburg, Pa. 17105
02279	Joliet Wrought Washer Div. MSL Industries, Inc. 203 Connell Avenue Joliet, Ill. 60436
06383	Panduit Corp. 17301 Ridgeland Avenue Tinley Park, Ill. 60477
08108	Lamp Industry for Use with Industry Designations and Abbreviations for Lamps
08244	Moeller Manufacturing Co., Inc. 47725 Michigan Avenue Belleville, Michigan 48111
09386	Budd Co., Automotive Division 12141 Charlevoix Detroit, Michigan 48215
09704	Seats, Inc. P.O. Box 115 Reedsburg, Wis.
11583	Champion Spark Plug Co. P.O. Box 910 900 Upton Toledo, Ohio 43601
13445	Cole Hersee Co. 20 Old Colony Ave. Boston, Mass. 02127
14892	Bendix Corp. The Brake and Steering Div. 410 W. Bendix Dr. South Bend, Ind. 46619
15873	Motorola, Inc. Automotive Products Div. 9401 W. Grand Ave. Franklin Park, Ill. 60131
18265	Donaldson Co. Inc. 1400 West 94 St. Minneapolis, Minn. 55431
18876	Army Missile Command Redstone Arsenal, Ala.
19728	Prestolite Co. Division of Electra Corp. 511 Hamilton St. Toledo, Ohio 43602
21260	McGraw Edison 333 W. River Rd. Elgin, Ill. 60120
23040	Ford Motor Co. Parts & Acces. Dearborn, Mich.
24161	Gates Rubber Co. 999 S. Broadway Denver, Colo. 80217
24617	General Motors Corp. 3044 Grand Blvd. W. Detroit, Mich. 48202
27964	Lake Odessa Machine Products 1131 Fourth Avenue Lake Odessa, Michigan 48849
29624	U.S. Machine and Tool 224 1-2 Garvan Garland, Texas 75040
41625	Morse Controls 21 Clinton Street Hudson, Ohio 44236

CODE	VENDOR'S NAME AND ADDRESS
43334	New Departure-Hyatt Bearings Div. General Motors Corp. Hayes Avenue Sandusky, Ohio 44870
49234	Protectoseal Co. 1920 S. Western Ave. Chicago, Ill. 60608
56118	Sparton Corp. 2400 E. Ganson Jackson, Mich. 49202
57733	Stewart Warner Corp. 1826 Diversey Parkway Chicago, Ill. 60614
59875	TRW Mechanical Products Div. 23555 Euclid Avenue Cleveland, Ohio 44117
60038	Timken Roller Bearing Co. 1835 Deuber Ave., S.W. Canton, Ohio 44706
63477	Wagner Electric Corp. Wagner Div. 6400 Plymouth Ave. St. Louis, Mo. 63133
66295	Wittek Mfg. Co. 4309 W. 24th St. Chicago, Ill. 60623
67049	Young Radiator Co. 709 Marquette St. Racine, Wisconsin 53403
70040	A C Spark Plug Div. General Motors Corp. 1300 N. Dort Highway Flint, Mich. 48556
70485	Atlantic India Rubber Works Inc. 571 W. Polk Street Chicago, Illinois 60607
70903	Belden Corp. 415 S. Kilpatrick Ave. Chicago, Ill. 60644
71400	Bussmann Mfg., Div. McGraw Edison Co. 2536 W. University St. St. Louis, Mo. 63017
71500	Carter Carburetor Div. ACF Industries Inc. 2840 North Spring Ave. St. Louis, Mo. 63107
72210	Columbus Auto Parts Hudson St. at North Freeway Columbus, Ohio 43211
72741	Dorman Products Co. 5757 Mariemont Cincinnati, Ohio 45227
73370	Fram Corporation (A Bendix Company) Providence, R.I. 02916
73740	Ross Gear Div., TRW Inc. Lebanon Plant Lebanon, Tenn. 37087
73842	Goodyear Tire and Rubber Co. 1144 E. Market Akron, Ohio 44316
74400	John W. Hobbs Div. Stewart Warner Corp. Ash St. and Yale Blvd. Springfield, Ill.
74410	Holland Hitch Co. 430 W. 18th Street Holland, Mich. 49423
74865	Chrysler Corp. Marine & Industrial Engine Div. 840 Huron Blvd. Marysville, Mich. 48040
75272	Kickhaefer Mfg. Co. 1964 Wisconsin Ave. Grafton, Wisconsin 53024

CODE	VENDOR'S NAME AND ADDRESS
75300	Chrysler Corp. Introl, Div. P.O. Box 1838 315 S. First St. Ann Arbor, Mich. 48106
76260	Mechanics Universal Joint Div. of Borg-Warner Corp. 2020 Harrison Avenue Rockford, Ill. 61101
77060	Packard Electric Div. General Motors Corp. 408 Dana St., N.E. Warren, Ohio 44481
77640	Ross Gear Div., TRW, Inc. Lafayette Plant Lafayette, Indiana 47902
77915	Sheller Globe Corp. Steering Wheel Div. South Bridge Street Portland, Ind. 47371
78500	North American Rockwell Corp. Transmission and Axle Div. Rockwell Standard Building Detroit, Mich. 48231
78940	United Air Cleaner Div. Halle Industries Inc. 9705 Cottage Grove Ave. P.O. Box 96944 Chicago, Illinois 60628
79150	Dana Corp., Victor Div. P.O. Box 1333 Chicago, Illinois 60690
79470	The Weatherhead Co. 300 E. 131st St. Cleveland, Ohio 44108
80523	American Chain and Cable Co., Inc. Cable Controls Div. 1022 E. Michigan Street Adrian, Mich. 49221
81074	Holub Industries, Inc. 413 Dekalb Avenue Sycamore, Ill. 60178
81263	Douglas Div. Scott and Fetzer Corp. 723 Fisher Bldg. Detroit, Mich. 48202
81348	Federal Specifications Promulgated by General Services Administration
82465	MacLean Fogg Lock Nut Co. 1000 Allanson Road Mundelein, Ill. 60060
83058	Carr Fastener Co. 238 Main Street Cambridge, Mass. 02142
86490	Rochester Rope Co. Plant Street Colpepper, Va. 22701
89007	Van Brode Milling Co. Cameron Clinton, Mass. 01510
89346	International Harvester Co. Motor Truck Division 2069 Lagonda Avenue Springfield, Ohio 45501
89373	Uniroyal, Inc. Uniroyal Infa. Center 1230 Ave. of the Americas New York 10020
91636	Curtis Industries Inc. 34999 Curtis East Lake, Ohio 44094
92850	Anchor Industries Inc. 1725 London Road Cleveland, Ohio 44112
92867	Orscheln Brake Lever Mfg. Co. 1177 N. Morley Moberly, Mo. 67270
94222	South Co., Inc. Lester, Pa. 19113
96906	Military Standards Promulgated by Standardization Div. Directorate of Logistic Services
99203	Couplings Co. 2205 W. Roosevelt Road Chicago, Illinois 60608

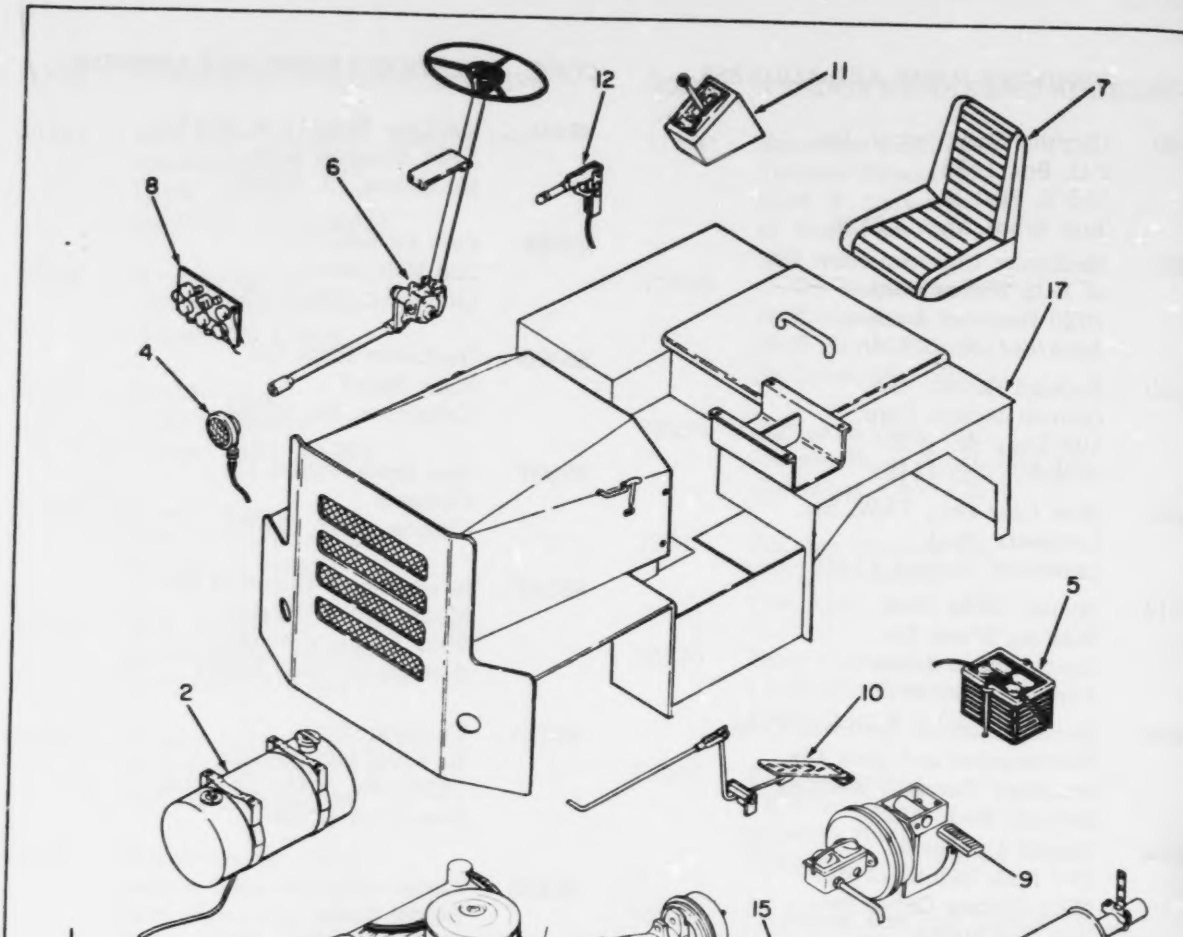

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Figure 6-1. Wheeled Warehouse Tractor

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-1-	GC340-4	TRACTOR, Wheeled, warehouse . . . . 4000 lb. drawbar pull	1	
- 1	No Number	. COOLING SYSTEM . . . . (See figure 6-2 for details)	1	
- 2	No Number	. FUEL SYSTEM . . . . (See figure 6-3 for details)	1	
- 3	No Number	. EXHAUST SYSTEM . . . . (See figure 6-4 for details)	1	
- 4	No Number	. ELECTRICAL SYSTEM . . . . (See figure 6-5 for details)	1	
- 5	No Number	. BATTERY AND MOUNTING . . . . (See figure 6-5 for details)	1	
- 6	No Number	. STEERING SYSTEM . . . . (See figure 6-7 for details)	1	
- 7	No Number	. SEAT ASSEMBLY . . . . (See figure 6-10 for details)	1	
- 8	No Number	. INSTRUMENT PANEL GROUP . . . . (See figure 6-5 for details)	1	
- 9	No Number	. BRAKE SYSTEM . . . . (See figure 6-12 for details)	1	
-10	No Number	. ACCELERATOR LINKAGE INSTALLATION . (See figure 6-14 for details)	1	
-11	No Number	. TRANSMISSION CONTROL INSTALLATION (See figure 6-15 for details)	1	
-12	No Number	. PARKING BRAKE LEVER INSTALLATION . (See figure 6-16 for details)	1	
-13	No Number	. FRONT AXLE INSTALLATION . . . . . . (See figure 6-17 for details)	1	
-14	No Number	. REAR AXLE INSTALLATION . . . . . . (See figure 6-19 for details)	1	
-15	No Number	. PROPELLER SHAFT INSTALLATION . . . (See figure 6-23 for details)	1	
-16	No Number	. ENGINE-TRANSMISSION INSTALLATION . (See figure 6-24 for details)	1	
-17	No Number	. FRAME AND SHEET METAL PARTS. . . . . (See figure 6-49 for details)	1	
-18	No Number	. REAR LEAF SPRING INSTALLATION . . . . (See figure 6-51 for details)	1	

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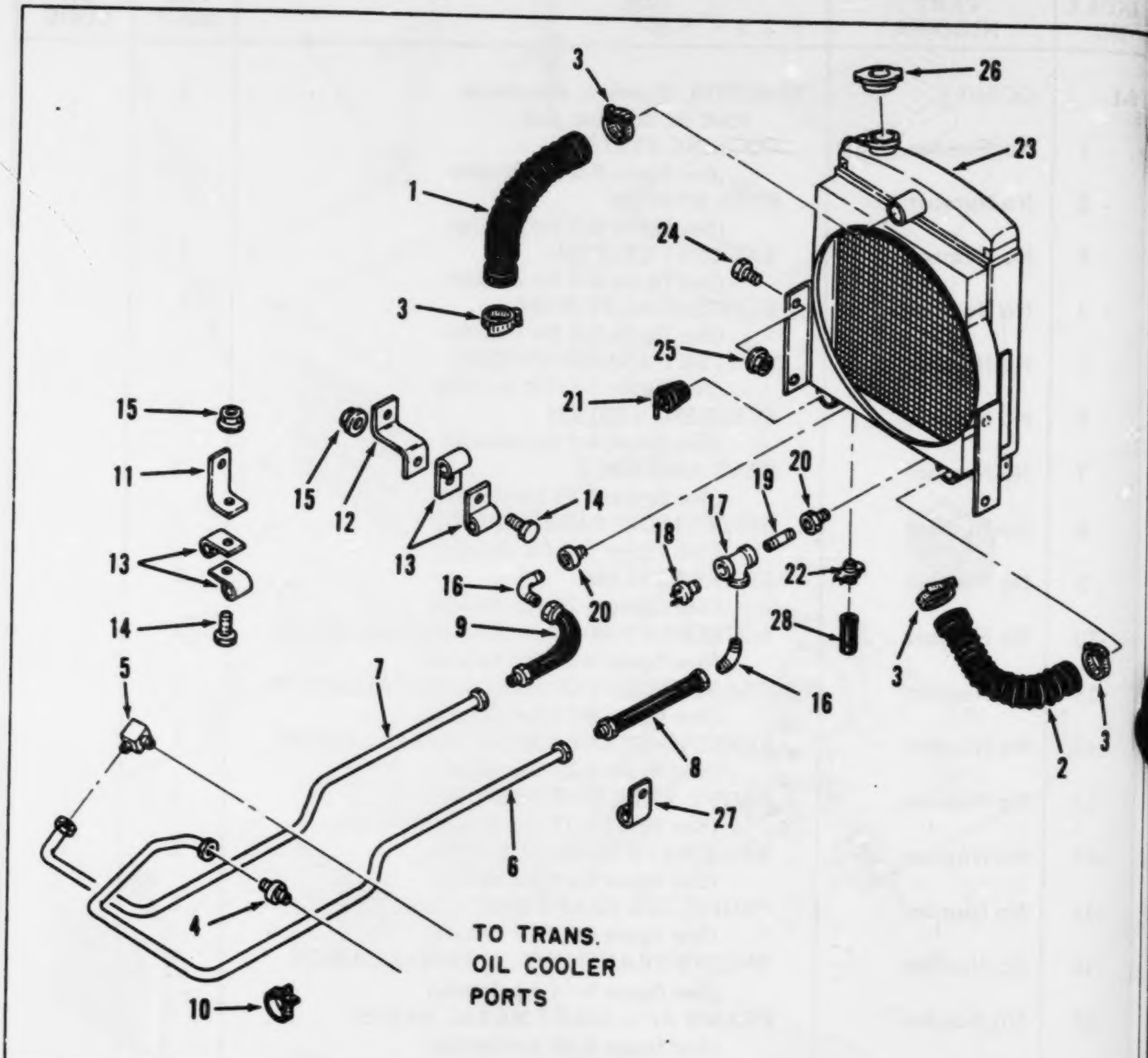
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OIL COOLER
PORTS
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Figure 6-2. Cooling System

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-2-	No Number	COOLING SYSTEM . . . . (See figure 6-1 for NHA)	REF	
- 1	VF30	. HOSE, Radiator inlet (24161)	1	
- 2	VF13	. HOSE, Radiator outlet (24161)	1	
- 3	28P	. CLAMP, Hose (66295)	4	
- 4	400x5x6	. CONNECTOR, Tube (79470)	REF	
- 5	400X5	. ELBOW, Tube (79470)	1	
- 6	42639	. TUBE ASSEMBLY, Oil cooler . . . . front port	1	
- 7	42640	. TUBE ASSEMBLY, Oil cooler . . . . rear port	1	
- 8	11205	. HOSE ASSEMBLY, Oil cooler . . . . (short) (79470)	1	
- 9	11093	. HOSE ASSEMBLY, Oil cooler . . . . (long) (79470)	1	
-10	SST2S	. TIE, Nylon (06383)	1	
-11	44573	. BRACKET, Tube support	1	
-12	47185	. BRACKET, Tube support	1	
-13	TS7D	. CLAMP, Tube (99203) . . . . (ATTACHING PARTS)	4	
-14	MS90725-58	. SCREW, Cap, hex head (96906)	2	
-15	9411507	. NUT, Hex, self locking (24617) . . . . —*—	2	
-16	9409931	. ELBOW, 90 degree (24617)	2	
-17	144082	. TEE, Pipe (24617)	1	
-18	362CZ	. SENDER, Conv .temperature (57733)	1	
-19	192032	. NIPPLE, Pipe (24617)	1	
-20	119923	. BUSHING, Reducing, pipe (24617)	2	
-21	T2002A	. PLUG, Rubber, expandable (08244)	1	
-22	#10KC	. COCK, Drain, radiator (99203)	1	
-23	D254037	. RADIATOR ASSEMBLY (67049) . . . . . (ATTACHING PARTS)	1	
-24	MS90725-60	. SCREW, Cap, hex head (96906)	4	
-25	9411507	. NUT, Hex, self locking (24617) . . . . —*—	4	
-26	B143340	. CAP, Radiator (67049)	1	
-27	CJV0913	. CLAMP, Hose (75272)	1	
-28	H-177	. HOSE, Radiator drain	1	

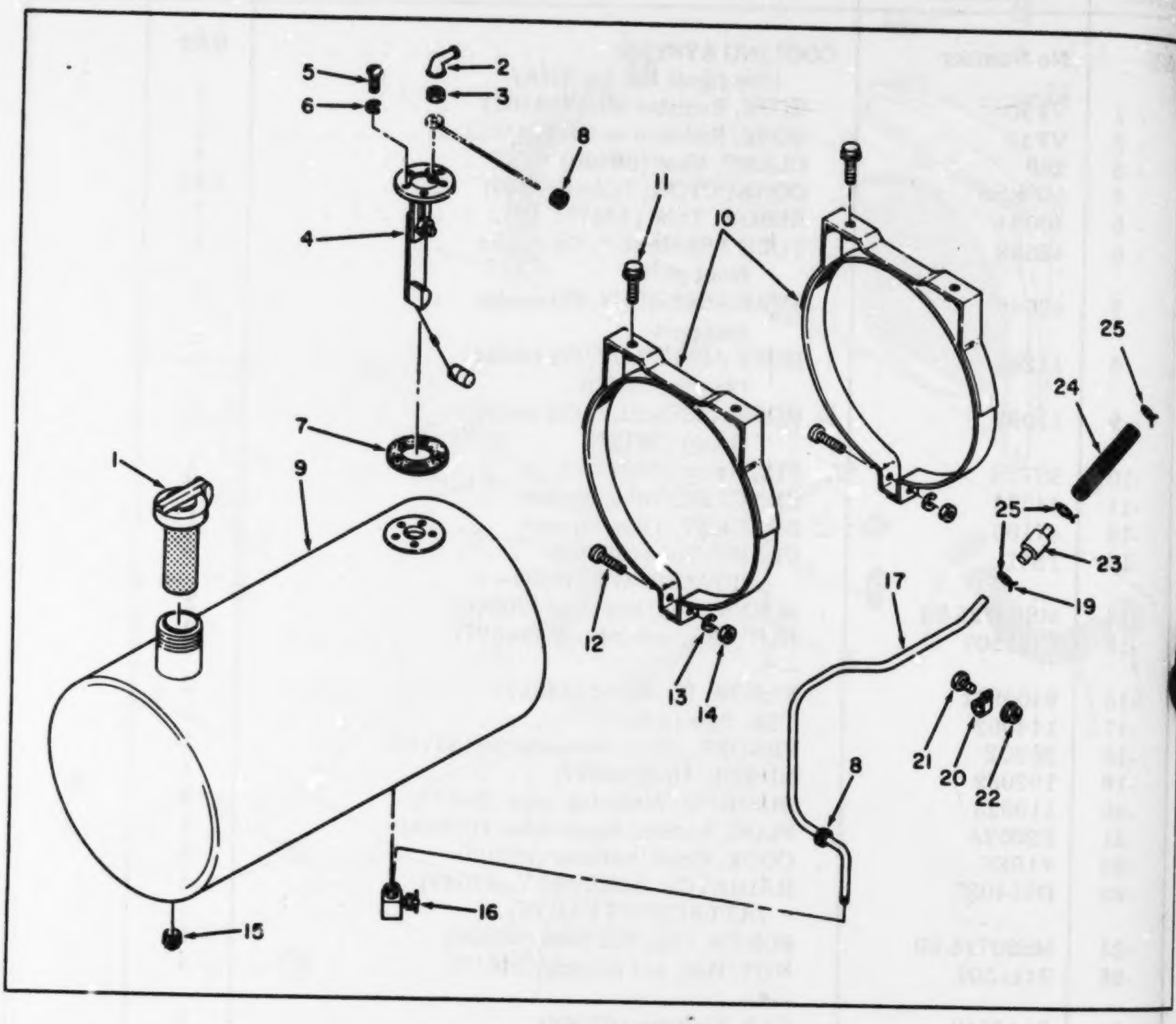
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Figure 6-3. Fuel System

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-3-	No Number	FUEL SYSTEM . . . . (See figure 6-1 for NHA)	REF	
- 1	1273-12	. FILLER AND STRAINER ASSEMBLY . . . (49234)	1	
- 2	5286201	. NIPPLE, Protective (77060)	1	
- 3	MS21044N3	. NUT, Hex, self locking (96906)	1	
- 4	6426778	. SENDER, Fuel level (70040) . . . . (ATTACHING PARTS)	1	
- 5	MS35207-260	. SCREW, Machine (96906)	5	
- 6	MS35338-43	. WASHER, Lock (96906) . . . . —*—	5	
- 7	1515832	. GASKET, Fuel sender (70040)	1	
- 8	2564	. GROMMET, Wire and tube (70485)	2	
- 9	42555	. TANK, Fuel	1	
-10	42556	. CLAMP ASSEMBLY, Tank mounting . . . . (ATTACHING PARTS)	2	
-11	274195	. SCREW, Cap, serrated hex (24617) . . . . . —*—	4	
-12	MS90725-64	. . SCREW, Cap, hex head (96906)	1	
-13	MS35338-46	. . WASHER, Lock (96906)	1	
-14	MS51967-8	. . NUT, Plain, hex (96906)	1	
-15	MS20913-2S	. PLUG, Pipe, square head (96906)	1	
-16	103KD	. VALVE, Shut-off (99203)	1	
-17	44570	. TUBE, Fuel line	1	
-18	Not Used			
-19	Not Used			
-20	CJV0613	. CLAMP, Tube mounting (75272) . . . . (ATTACHING PARTS)	1	
-21	MS90725-60	. SCREW, Cap, hex head (96906)	1	
-22	9411507	. NUT, Hex, self locking (24617) . . . . —*—	1	
	2084467	. . FILTER, Fuel (74865)	1	
-23	2525254	. . . ELEMENT (74865)	1	
-24	1739230	. . . HOSE, Filter connecting (74865)	2	
-25	2806764	. . CLAMP, Hose (74865)	4	

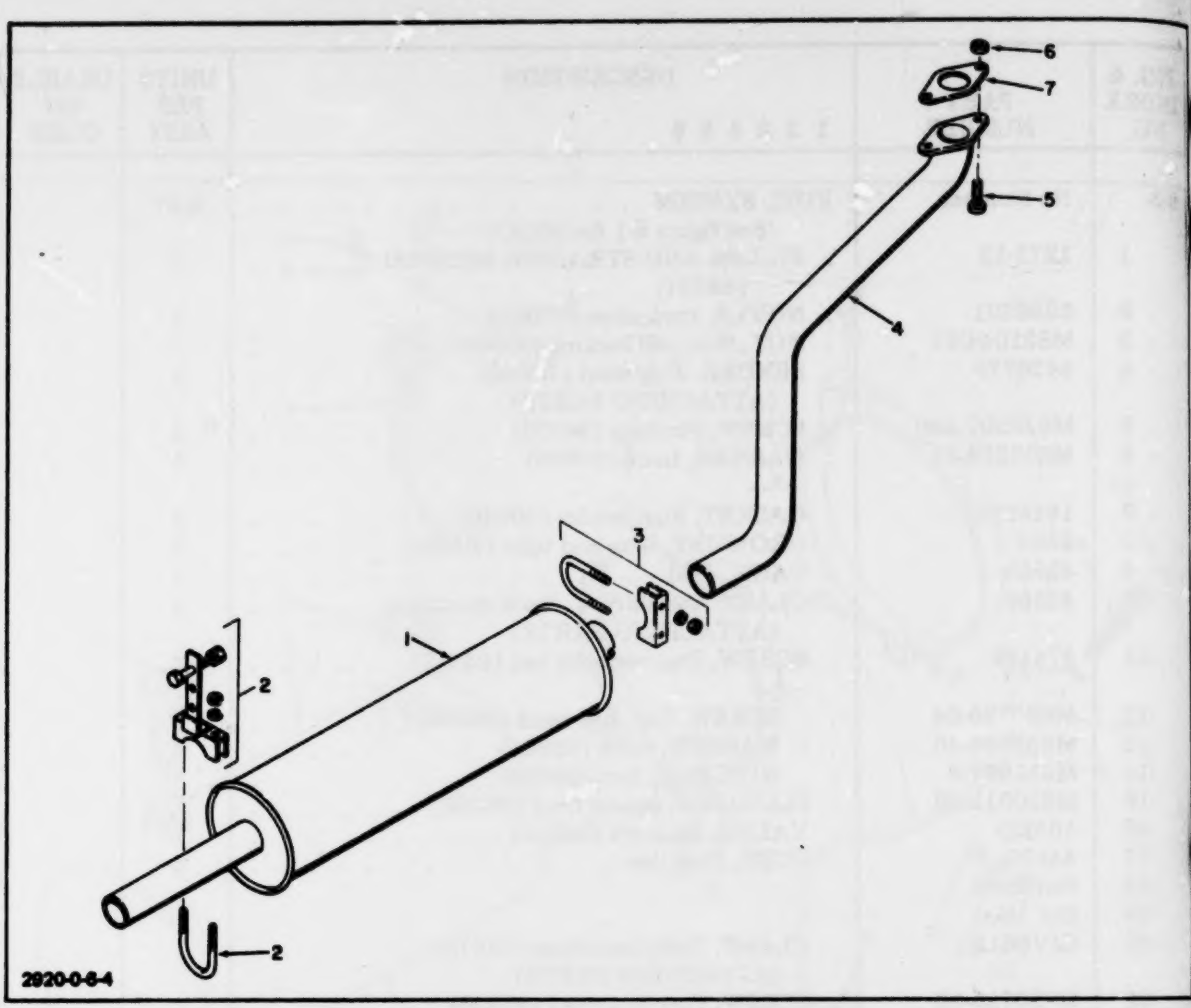

Figure 6-4. Exhaust System

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-4-	No Number	EXHAUST SYSTEM . . . . (See figure 6-1 for NHA)	REF	
- 1	46311	. MUFFLER, Exhaust . . . . (ATTACHING PARTS)	1	
- 2	UST15-20	. HANGER ASSEMBLY (27964)	1	
- 3	2000	. CLAMP, Exhaust pipe (27964) . . . . —*—	1	
- 4	41028	. PIPE, Exhaust . . . . (ATTACHING PARTS)	1	
- 5	MS90726-90	. SCREW, Cap, hex head (96906)	2	
- 6	9415186	. NUT, Hex, self locking (24617) . . . . . . —*—	2	
- 7	5435CS	. GASKET, Exhaust pipe (79150)	1	

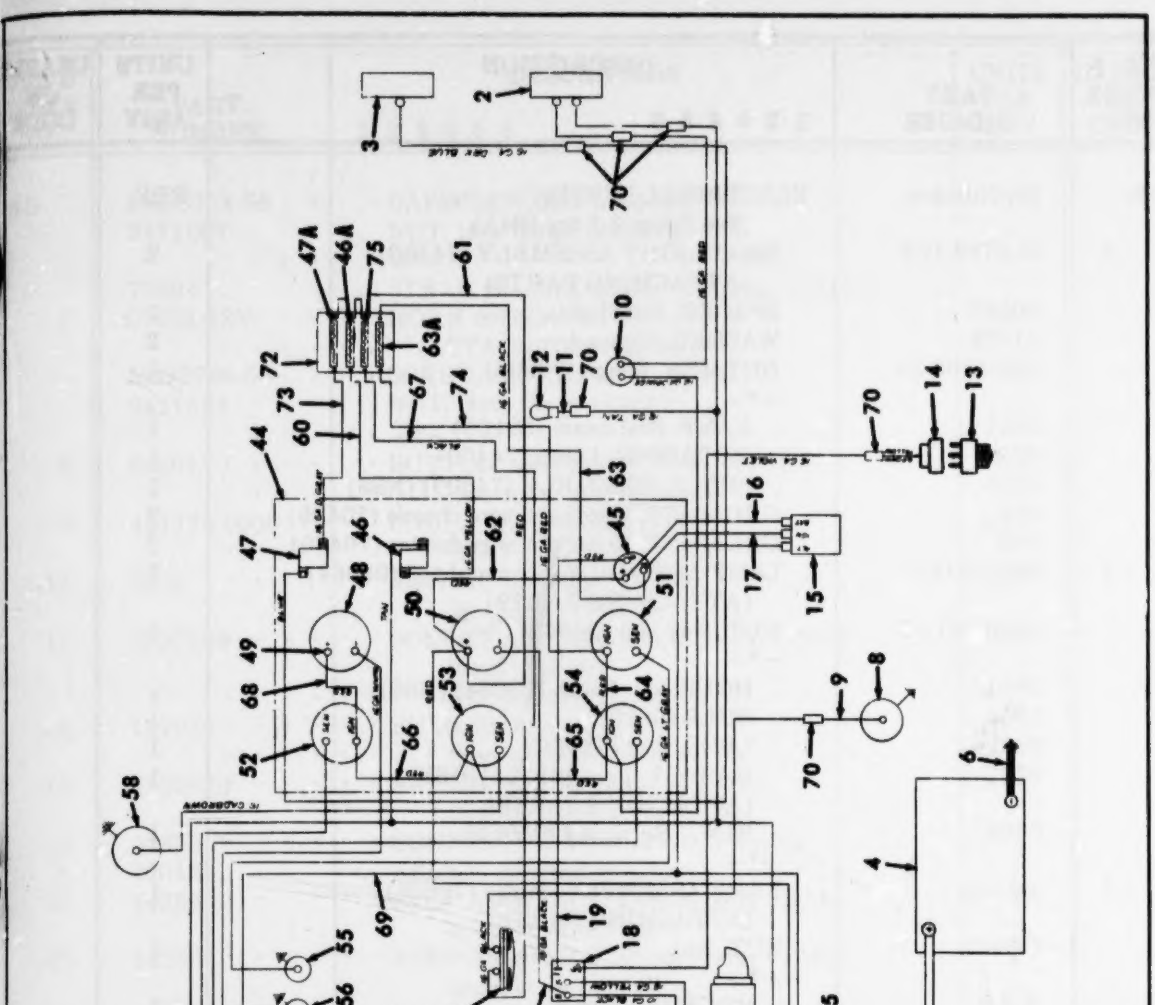
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Figure 6-5. Electrical System

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABL ON COD
6-5-	No Number	ELECTRICAL SYSTEM	REF	
		(See figure 6-1 for NHA)		
- 1	M-2784-12V	. HEADLIGHT ASSEMBLY (74400)	2	
		(ATTACHING PARTS)		
	30387	. SPACER, Headlight	1	
	31376	. WASHER, Cupped	2	
	MS51968-14	. NUT, Hex, flange (96906)	1	
		---*---		
	4411	. . LAMP, Seal beam (08108)	1	
	4023	. . RETAINER, Lamp (74400)	1	
	4305	. . SHELL ASSEMBLY (74400) (NSS)	1	
	316	. GROMMET, Headlight wire chassis (70485)	2	
	190	. GROMMET, Headlight wire fender (70485)	2	
- 2	355-2R12V	. LAMP ASSEMBLY, Stop and tail (08064)	2	
		(ATTACHING PARTS)		
	MS35691-17	. NUT, Hex jam (96906)	1	
		---*---		
	9651	. . HOUSING, Lamp (08064) (NSS)	1	
	1034	. . BULB (08108)	1	
	9652-R	. . LENS, Red (08064)	1	
	9687	. . GASKET, Lens (08064)(NSS)	1	
		(ATTACHING PARTS)		
	9655	. . RING, Retaining (08064)	1	
		---*---		
- 3	4-810R	. LAMP ASSEMBLY, Pintle (72635)	1	
		(ATTACHING PARTS)		
	COML	. NUT, Hex	1	
		---*---		
	N.S.S.	. . HOUSING, Lamp	1	
	1156	. . BULB (08108)	1	
	88-04470	. . PIGTAIL ASSEMBLY (72635)	1	
	77-150CL	. . LENS, Clear (72635)	1	
	N.S.S.	. . GASKET, Lens	1	
		(ATTACHING PARTS)		
	88-01390	. . RING, Retaining (72635)	1	
		---*---		
- 4	6124R	. BATTERY, Charged and dry (08163)	1	
	34083	. HOLDDOWN, Battery	1	
		(ATTACHING PARTS)		
	119389	. BOLT, Carriage (24617)	2	
	273802	. NUT, Hex flange (24617)	2	
	103340	. WASHER, Flat (24617)	2	
		---*---		
- 5	73134	. CABLE, Battery "+" to starter (70903)	1	
	2513	. GROMMET, Battery cable (70485)	1	
- 6	70826	. STRAP, Battery "–" to chassis (70903)	1	
		(ATTACHING PARTS)		

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-5-	MS90725-58	. CAPSCREW, Hex head (96906)	1	
	9411507	. NUT, Hex flange (24617)	1	
		---*---		
	70894	. STRAP, Bonding, engine to chassis (70903)	1	
- 7	C7521-12V	. HORN ASSEMBLY (56118)	1	
		(ATTACHING PARTS)		
	MS90726-55	. SCREW, Cap, hex head (96906)	1	
	9411507	. NUT, Hex, flange (24617)	1	
		---*---		
- 8	465617	. BUTTON ASSEMBLY, Horn (77640) (See figure 6-7 for NHA)	REF	
- 9	451774-6000	. CABLE, Horn button (77640) (See figure 6-7 for NHA)	REF	
-10	8628	. SWITCH, Stop light (13445) (See figure 6-12 for NHA)	REF	
-11	1937108	. SOCKET AND LEAD ASSEMBLY, Shift bezel (74865) (See figure 6-15 for NHA)	REF	
-12	127934	. BULB, Shift bezel (74865) (See figure 6-15 for NHA)	REF	
-13	2932820	. SWITCH, Neutral safety (74865) (See figure 6-39 for NHA)	REF	
-14	44605	. CONNECTOR, Neutral safety switch	1	
-15	46045	. RELAY, Alternator cutout	1	
-16	14256	. WIRE ASSEMBLY, Cutout relay "B" to ignition switch "B"	1	
-17	14256	. WIRE ASSEMBLY, Cutout relay "I" to ignition switch "I"	1	
-18	2444517	. RELAY, Starter (74865)	1	
		(ATTACHING PARTS)		
	MS90725-6	. SCREW, Cap, hex head (96906)	2	
	273801	. NUT, Hex flange (24617)	2	
		---*---		
-19	32109-9	. WIRE ASSEMBLY, Start relay "I" to ignition switch "S"	1	
-20	34012-9	. WIRE ASSEMBLY, Start relay "B" to ammeter "-"	1	
-21	3755900	. STARTER MOTOR ASSEMBLY (74865) (See figure 6-30 for breakdown)	1	
-22	4091565	. ALTERNATOR ASSEMBLY (74865) (See figure 6-27 for breakdown)	REF	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-5-23	48305-6	. WIRE ASSEMBLY, Alternator "BAT" to protector	1	
-24	48307-8	. WIRE ASSEMBLY, Alternator "FLD" to regulator red lead	1	
-25	48307-8	. WIRE ASSEMBLY, Alternator "FLD" to regulator yellow lead	1	
-26	Not Used			
-27	Not Used			
-28	3438150	. REGULATOR, Voltage (74865) (ATTACHING PARTS)	1	
	MS90725-8	. SCREW, Cap, hex head (96906)	2	
	273801	. NUT, Hex flange (24617)	2	
		---*---		
-29	3438370	. HARNESS, Regulator (74865)	1	
-30	2926861	. RETAINER, Harness (74865)	1	
-31	EK-122	. PROTECTOR, Reverse polarity (31211) (ATTACHING PARTS)	1	
	MS90725-8	. SCREW, Cap, hex head (96906)	1	
	273801	. NUT, Hex flange (24617)	1	
	MS90725-8	. SCREW, Cap, hex head (96906)	2	
	273801	. NUT, Hex flange (24617)	2	
		---*---		
-32	48306-8	. WIRE ASSEMBLY, Protector to regulator red lead	1	
-33	3874001	. COIL AND BRACKET ASSEMBLY, ignition (74865) (See figure 6-25 for NHA)	1	
-34	3874020	. CONTROL UNIT, Electronic ignition (74865) (ATTACHING PARTS)	1	
	120854	. SCREW, Cap, hex head (24617)	2	
	9416918	. NUT, Hex flange (24617)	2	
		---*---		
-35	3874767	. RESISTOR, Ballast (74865) (ATTACHING PARTS)	1	
	121900	. SCREW, Cap, hex head (24617)	1	
	9416918	. NUT, Hex, flange (24617)	1	
		---*---		
	3675578	. BRACKET, Control unit and resistor mounting (74865)	1	
-36	3513753	. HARNESS, Control unit (74865)	1	
-37	3675881	. CABLE, Resistor to chassis harness (74865) (N.S.S.)	1	
-38	3755057	. DISTRIBUTOR, Ignition (74865) (See figure 6-29 for breakdown) (See figure 6-25 for NHA)	REF	
-39	48106	. CABLE SET, Ignition (See figure 6-25 for NHA)	REF	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-5-40	3874124	. . CABLE, No. 1, 2, 5 and 6 (74865)	4	
-41	3874099	. . CABLE, No. 3 and 4 (74865)	2	
-42	3656514	. . CABLE, Coil (74865)	1	
-43	RBL-13Y	. PLUG, Spark (11583) (See figure 6-25 for NHA)	REF	
-44	31482	. PANEL, Instrument	1	
		(ATTACHING PARTS)		
	132915	. SCREW, Machine (24617)	6	
	9413359	. NUT, Hex flange (24617)	6	
		---*---		
	SS-51051-K2915	. PLUG, "DOT," snap in (83058)	3	
-45	95514-A	. SWITCH, Ignition and start (13445)	1	
	8394	. . KEY, Ignition (13445)	1	
-46	5053	. SWITCH, Headlight (13445)	1	
-46A	SFE20	. . FUSE, Cartridge (71400)	1	
-47	5053	. SWITCH, Rear light (13445)	1	
-47A	SFE10	. . FUSE, Cartridge (71400)	1	
-48	5600-1	. HOURMETER (74400)	1	
		(ATTACHING PARTS)		
	132705	. SCREW, Machine (24617)	3	
	9414031	. NUT, Hex flange (24617)	3	
		---*---		
-49	2962448	. INSULATOR, Hourmeter leads (77060)(N.S.S.)	2	
-50	6473348	. AMMETER (70040)	1	
		(ATTACHING PARTS)		
	9413349	. NUT, Hex flange (clamp studs) (24617)	2	
	9414031	. NUT, Hex flange (terminal studs) (24617)	2	
		---*---		
-51	646-621	. GAUGE, Oil pressure (70040)	1	
		(ATTACHING PARTS)		
	9413349	. NUT, Hex flange (clamp studs) (24617)	2	
	9414031	. NUT, Hex flange (terminal studs) (24617)	2	
		---*---		
-52	456ET	. GAUGE, Torque converter temperature (57733)	1	
-53	6430694	. GAUGE, Fuel level (70040)	1	
		(ATTACHING PARTS)		
	9413349	. NUT, Hex flange (clamp studs) (24617)	2	
	9414031	. NUT, Hex flange (terminal studs) (24617)	2	
		---*---		
-54	465ER	. GAUGE, Water temperature (57733)	1	
-55	6460032	. SENDER, Oil pressure (70040)	1	
-56	MI-1425	. SWITCH, Hourmeter (74400)	1	
		(ATTACHING PARTS)		
	119923	. BUSHING, Reducing (24617)	1	
	192032	. NIPPLE, Close (24617)	1	
	127960	. ELBOW, Street (24617)	1	
	144082	. TEE, Pipe (24617)	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABL ON COD
6-5-		---*---		
-57	334J	. SENDER, Torque converter temperature . . . (57733)	REF	
-58	6426778	. SENDER, Fuel level (70040) . . . . (See figure 6-3 for NHA)	REF	
-59	362CZ	. SENDER, Water temperature (57733) . . . . (See figure 6-2 for NHA)	REF	
-60	61310-13	. [illegible]RE ASSEMBLY, headlight switch to . . . . fuse block assembly	1	
-61	41483-5	. WIRE ASSEMBLY, Ammeter "+" to . . . . . . fuse block assembly	1	
-62	41483-8	. WIRE ASSEMBLY, Ammeter "+" to . . . . . . ignition switch "B"	1	
-63	61313-20	. WIRE ASSEMBLY, ... Ignition switch "I" to fuse block assembly	1	
-63A	SFE10	. . FUSE, Cartridge (71400)	1	
-64	14256-5	. WIRE ASSEMBLY, Oil pressure gauge "I" . . . to water temperature gauge "I"	1	
-65	14256-5	. WIRE ASSEMBLY, Water temperature gauge . . "I" to fuel gauge "I"	1	
-66	14256-5	. WIRE ASSEMBLY, Fuel gauge "I" to . . . . . . torque converter temperature gauge	1	
-67	61313-20	. WIRE ASSEMBLY, ... Horn to fuse block assembly	1	
-68	32109-9	. WIRE ASSEMBLY, Torque converter temperature gauge "I" to hourmeter "+" . . .	1	
-69	44603	. HARNESS, Tractor wiring . . . . (ATTACHING PARTS)	1	
-70	2321	. CONNECTOR, One wire (81263)	7	
-71	2209	. CONNECTOR, "Y" (81263)	1	
	EC-4	. CLIP, Harness, 1/4" I.D. (81074)	4	
	CJV-0913	. CLIP, Harness, "J" (75272)	1	
	1213	. CLAMP, Harness and battery cable (75272) . .	1	
-72	3833-4	. FUSE BLOCK ASSEMBLY	1	
-73	61311-10	. WIRE ASSEMBLY, Rear light switch to . . . . fuse block assembly	1	
-74	61312-16	. WIRE ASSEMBLY, Oil pressure gauge "I" . . . to fuse block assembly	1	
-75	SFE20	. FUSE, Cartridge (71400)	1	

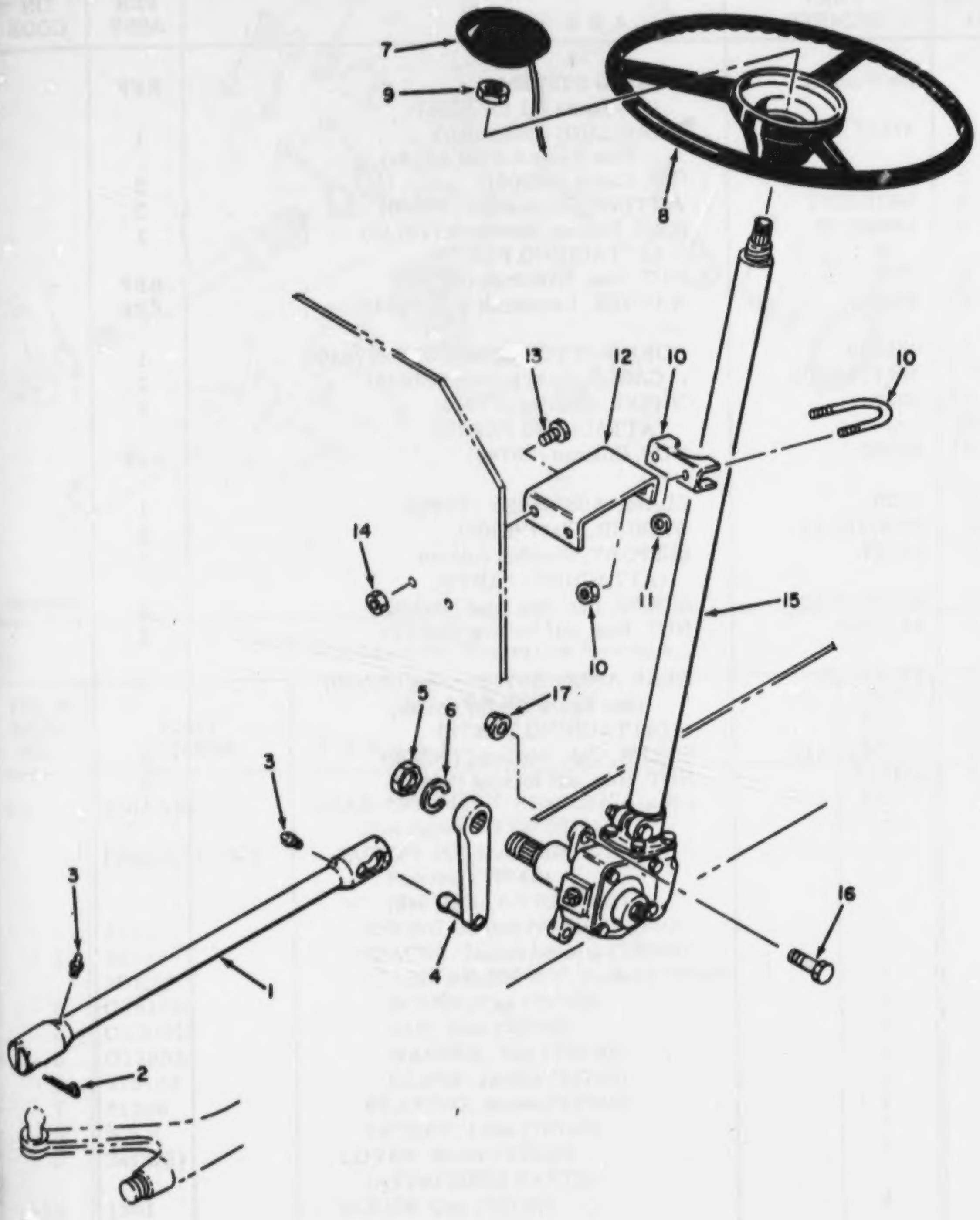
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Figure 6-7. Steering System

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-7-	No Number	STEERING SYSTEM (See figure 6-1 for NHA)	REF	
- 1	44517	. DRAG LINK ASSEMBLY (See figure 6-9 for details)	1	
- 2	MS24665-359	. PIN, Cotter (96906)	2	
- 3	MS15003-5	. FITTING, Lubrication (96906)	2	
- 4	430931-28	. ARM, Pitman, levershaft (73740)	1	
		(ATTACHING PARTS)		
- 5	3101	. NUT, Hex, levershaft (73740)	REF	
- 6	3304	. WASHER, Levershaft nut (73740)	REF	
		—*—		
- 7	465379	. HORN BUTTON ASSEMBLY (77640)	1	
	451774-6000	. . CABLE, Horn button (77640)	1	
- 8	2389	. WHEEL, Steering (77915)	1	
		(ATTACHING PARTS)		
- 9	33050	. NUT, Column (73740)	REF	
		—*—		
-10	1500	. CLAMP ASSEMBLY (27964)	1	
-11	MS27183-12	. WASHER, Flat (96906)	2	
-12	44417	. SUPPORT, Steering column	1	
		(ATTACHING PARTS)		
-13	MS90725-60	. SCREW, Cap, hex head (96906)	2	
-14	9411507	. NUT, Hex, self locking (24617)	2	
		—*—		
-15	253AA033	. GEAR ASSEMBLY, Steering (73740) (See figure 6-8 for details)	1	
		(ATTACHING PARTS)		
-16	MS90725-113	. SCREW, Cap, hex head (96906)	3	
-17	9415187	. NUT, Hex, self locking (24617)	3	
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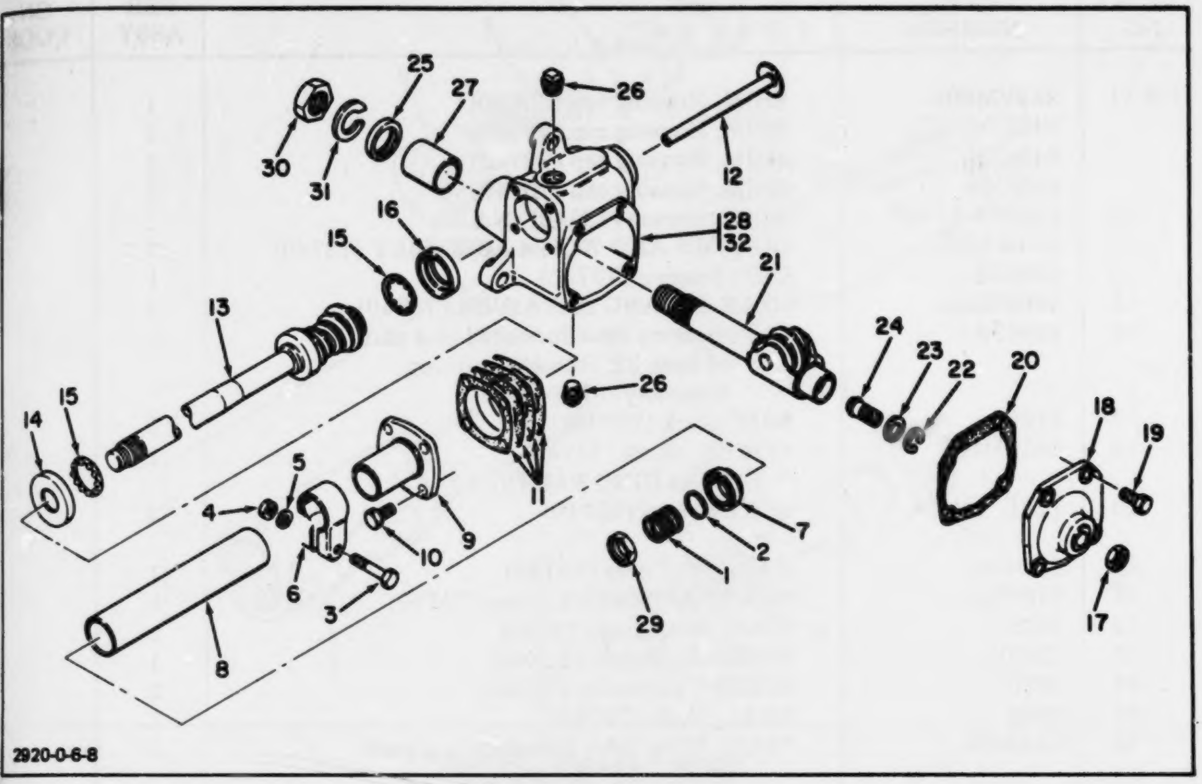
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Figure 6-8. Steering Gear Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-8-	253AA033	GEAR ASSEMBLY, Steering (73740) (See figure 6-7 for NHA)	REF	
	095235A1-3381	. JACKET TUBE ASSEMBLY, Steering (73740) (See figure 6-7 for NHA)	1	
- 1	33221	. . SPRING, Jacket bearing (73740)	1	
- 2	33741	. . SPACER, Jacket bearing (73740)	1	
	3DR03	. . CLAMP ASSEMBLY, Jacket (73740)	1	
- 3	G181620	. . . SCREW, Cap (73740)	1	
- 4	G120368	. . . NUT, Hex (73740)	1	
- 5	G138538	. . . WASHER, Flat (73740)	1	
- 6	475104	. . . CLAMP, Jacket (73740)	1	
- 7	31208	. . BEARING, Jacket (73740)	1	
- 8	N.S.S.	. . JACKET, Tube (73740)	1	
- 9	24DC24	. COVER, Worm (73740) (ATTACHING PARTS)	1	
-10	1201	. SCREW, Cap (73740) —*—	4	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-8-11	253VM003	. SHIM, Housing cap (73740)	1	
	24DC05	. SHIM, Housing cap (73740)	5	
	24DC04	. SHIM, Housing cap (73740)	1	
	24DC03	. SHIM, Housing cap (73740)	2	
-12	402294-A1-800	. TUBE, Grease (73740) (N.S.S.)	1	
-13	253MA021	. COLUMN AND WORM ASSEMBLY (73740)	1	
-14	400078	. CUP, Bearing (73740)	1	
-15	400081AL	. BEARING AND RETAINER (73740)	2	
-16	400056	. CUP, Bearing (also furnished as a part of item 32, Housing and Cup Assembly) (73740)	1	
-17	3100	. NUT, Lock (73740)	1	
-18	253TM000	. COVER, Shaft (73740)	1	
		(ATTACHING PARTS)		
-19	1201	. SCREW, Cap (73740)	4	
		---*---		
-20	24DF04	. GASKET, Cover (73740)	1	
-21	24DF24	. SHAFT ASSEMBLY, Gear (73740)	1	
-22	3405	. RING, Retaining (73740)	1	
-23	4DF03	. WASHER, Thrust (73740)	1	
-24	3020	. SCREW, Adjusting (73740)	1	
-25	3562	. SEAL, Shaft (73740)	1	
-26	G445686	. PLUG, Filler (also furnished as a part of item 32, Housing and Cup Assembly) (73740)	2	
-27	24DC07	. BUSHING, Housing (73740)	1	
-28	N.S.S.	. HOUSING, Gear (For service, order item 32, Housing and Cup Assembly) (73740)	1	
-29	33050	. NUT, Column (73740)	1	
-30	3101	. NUT, Shaft (73740)	1	
-31	3304	. WASHER, Shaft (73740)	1	
-32	253CM030-J1	. HOUSING AND CUP ASSEMBLY (Includes items 16, 26, and 28) (73740)	A/R	

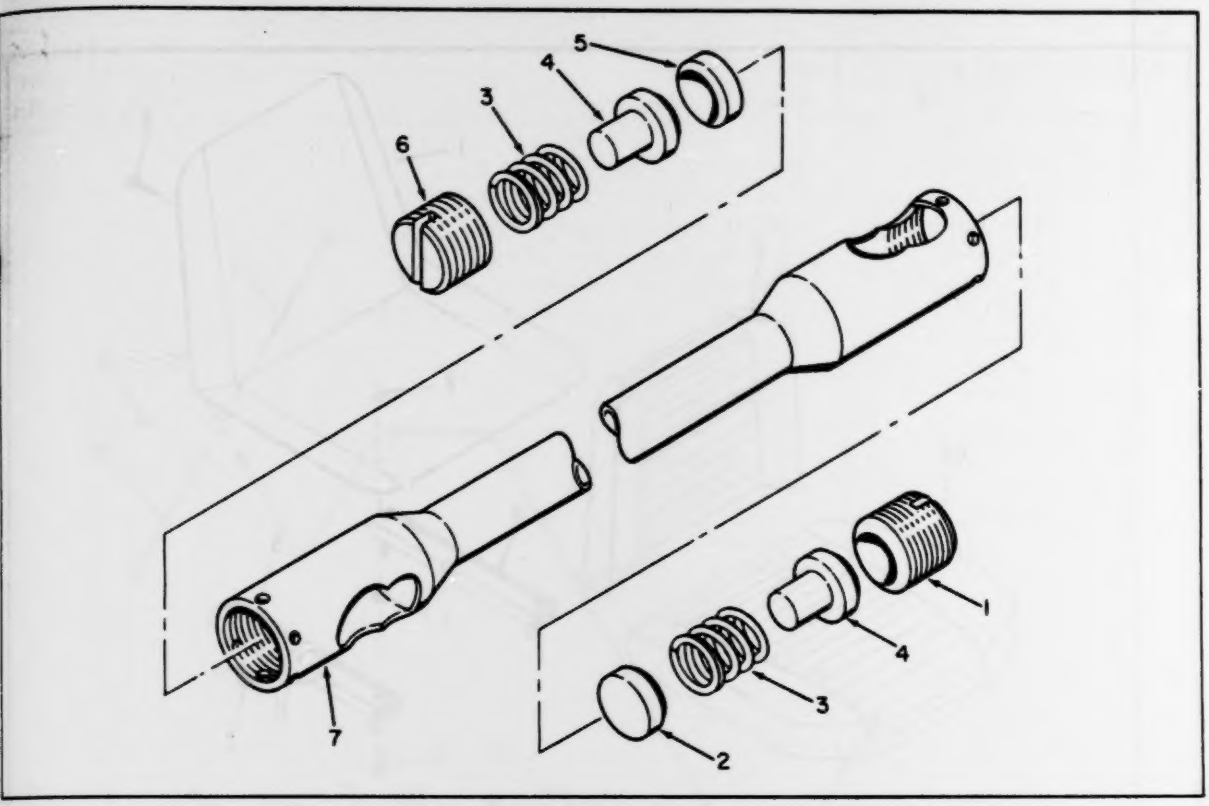

Figure 6-9. Drag Link Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-9-	44517	DRAG LINK ASSEMBLY (See figure 6-7 for NHA)	REF	
- 1	S10543	. PLUG, Adjusting, rear (72210)	1	
- 2	S5339	. SEAT, Spring, rear (77210)	1	
- 3	S5896	. SPRING, Helical, compression (72210)	2	
- 4	S10544	. SEAT, Ball socket, outer front and inner rear (72210)	2	
- 5	S3899A	. SEAT, Ball socket, inner front (72210)	1	
- 6	S836	. PLUG, Adjusting, front (72210)	1	
- 7	N.S.S.	. LINK, Drag	1	

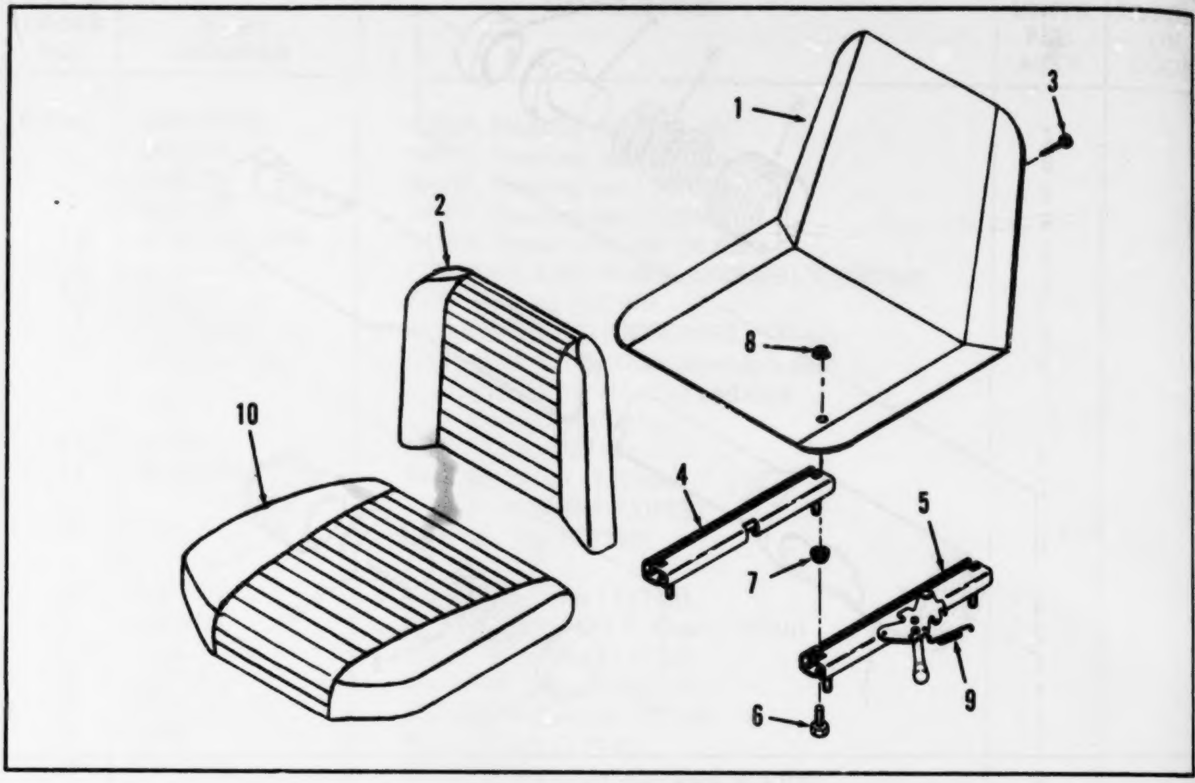

Figure 6-10. Seat Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-10-	907-18	SEAT ASSEMBLY (09704) . . . . (See figure 6-1 for NHA)	REF	
- 1	319431	. FRAME, Seat (09704)	1	
- 2	319434	. CUSHION, Back rest (09704) . . . . (ATTACHING PARTS)	1	
- 3	707196	. SCREW, Clutch head (09704) . . . . —*—	5	
- 4	707005	. SLIDE, Seat frame (09704)	1	
- 5	300021	. SLIDE ADJUSTER, Seat frame (09704) . . . (ATTACHING PARTS)	1	
- 6	707567	. BOLT, Carriage (09704)	4	
- 7	707282	. SPACER, Slide (09704)	4	
- 8		. NUT, Hex, self locking (09704) . . . . —*—	4	
- 9	707283	. SPRING, Adjuster (09704)	1	
-10	323863	. CUSHION, Seat (09704)	1	

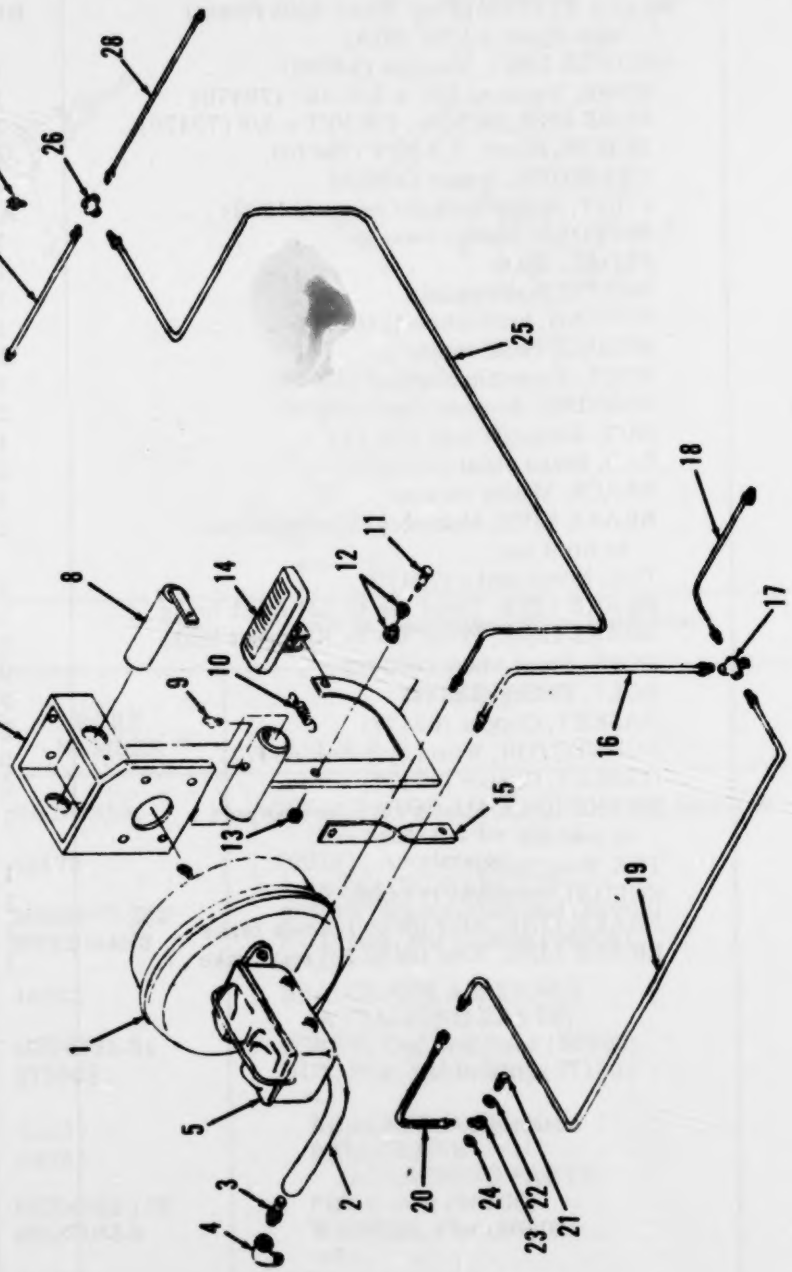
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Figure 6-12. Brake System

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-1-2-	No Number	BRAKE SYSTEM (Four Wheel Split Power) (See figure 6-1 for NHA)	REF	
-1	2511017	. POWER UNIT, Vacuum (14892)	1	
-2	A-100	. HOSE, Vacuum, 3/8 x 5/8 -16" (79470)	1	
-3	10006-106	. HOSE END, Barbtite, 3/8 NPT x 3/8 (79470)	1	
-4	3400x6	. ELBOW, Street, 3/8 NPT (79470).	1	
-5	2226080	. CYLINDER, Master (14892)	1	
	2726	. . KIT, Master cylinder repair (14892)	AR	
-6	61879	. SUPPORT, Master vacuum	1	
-7	41417	. PEDAL, Brake	1	
-8	33932	. SHAFT, Brake pedal	1	
-9	191758	. FITTING, lubrication (24617)	1	
-10	10340	. SPRING, Pedal return	1	
-11	AB-2462-A	. BOLT, Eccentric pushrod (23040)	1	
-12	B2A-2474-A	. BUSHING, Eccentric bolt (23040)	2	
-13	126006	. NUT, Eccentric bolt (24617)	1	
-14	3-5272	. PAD, Brake pedal (92850)	1	
-15	45375	. BRACE, Master vacuum	1	
-16	61362	. BRAKE LINE, Master cylinder front port to front tee	1	
-17	FC-4287	. TEE, Front brake (79470)	1	
-18	61361	. BRAKE LINE, Front tee to LH front brake	1	
-19	61359	. BRAKE LINE, Front tee to RH front brake	1	
-20	10110-R91	. HOSE, Front brake (89346)	2	
-21	FC11409	. BOLT, Fitting (63477)	2	
-22	242	. GASKET, Copper (63477)	2	
-23	FC2579	. CONNECTOR, Wheel cylinder (63477)	2	
-24	FC13030	. GASKET, Copper (63477)	2	
-25	61363	. BRAKE LINE, Master cylinder rear port to rear tee	1	
-26	41662	. TEE, Rear brake	1	
-27	8628	. SWITCH, Stoplight (13445)	1	
-28	42637	. BRAKE LINE, Rear tee to LH rear brake	1	
-29	42636	. BRAKE LINE, Rear tee to RH rear brake	1	

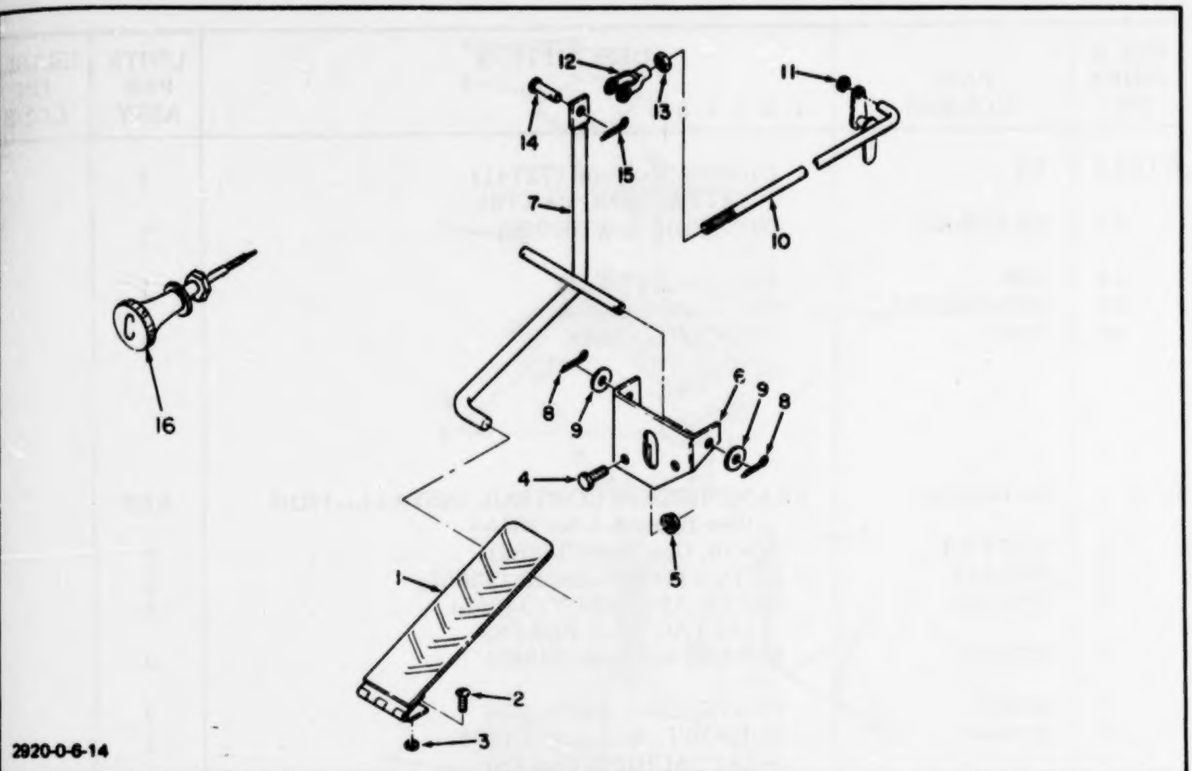

Figure 6-14. Accelerator Linkage Installation

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-14-	No Number	ACCELERATOR LINKAGE INSTALLATION . . (See figure 6-1 for NHA)	REF	
- 1	44179	. PEDAL, Accelerator	1	
		(ATTACHING PARTS)		
- 2	MS35207-263	. SCREW, Machine, slotted (96906)	2	
- 3	MS21044N3	. NUT, Hex, self locking (96906)	2	
		---*---		
	46082	. BELLCRANK ASSEMBLY	1	
		(ATTACHING PARTS)		
- 4	MS90725-34	. SCREW, Cap, hex head (96906)	2	
- 5	273802	. NUT, Hex, self-locking (27183)	2	
		---*---		
- 6	44429	. . BRACKET, Accelerator	1	
- 7	48383	. . BELLCRANK	1	
		(ATTACHING PARTS)		
- 8	MS24665-132	. . PIN, Cotter (96906)	2	
- 9	MS27183-9	. . WASHER, Flat (96906)	2	
		---*---		
-10	44477	. ROD, Accelerator	1	
-11	7L9095	. CLIP, Spring (91636)	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-14-12	Y2	. CLEVIS, Rod end (72741)	1	
		(ATTACHING PARTS)		
-13	MS51968-2	. NUT, Plain, hex (96906)	1	
		---*---		
-14	C38	. PIN, Clevis (72741)	1	
-15	MS24665-283	. PIN, Cotter (96906)	1	
-16	61367	. CONTROL, Choke	1	
6-15-	No Number	TRANSMISSION CONTROL INSTALLATION .	REF	
		(See figure 6-1 for NHA)		
- 1	4407VX9	. KNOB, Gearshift (74865)	1	
- 2	2826642	. ACTUATOR, Gearshift (74865)	1	
- 3	2908355	. BEZEL ASSEMBLY (74865)	1	
		(ATTACHING PARTS)		
- 4	6025938	. SCREW, Machine (74865)	4	
		---*---		
- 5	42480	. PLATE, Lever stop	1	
- 6	2515800	. SUPPORT, Actuator (74865)	1	
		(ATTACHING PARTS)		
- 7	AD64AH	. RIVET, Blind (29624)	4	
		---*---		
- 8	127934	. LAMP, Incandescent (74865)	1	
- 9	1937108	. SOCKET AND LEAD ASSEMBLY (74865)	1	
-10	Not Used			
-11	45020	. CABLE, Modified, shift	1	
-12	Not Used			
-13	Not Used			
-14	2564	. GROMMET, Rubber (70485)	1	
-15	38313	. BOX, Shift control	1	
		(ATTACHING PARTS)		
-16	MS90725-6	. SCREW, Cap, hex head (96906)	2	
-17	273801	. NUT, Hex, self locking (24617)	2	
		---*---		
-18	COV0813	. CLAMP, Cable (75272)	1	
		(ATTACHING PARTS)		
-19	MS90725-60	. SCREW, Cap, hex head (96906)	1	
-20	9411507	. NUT, Hex, self locking (24617)	1	
		---*---		
-21	42288	. ANCHOR BRACKET, Cable	1	
-22	44482	. BRACKET, Down shift	1	
		(ATTACHING PARTS)		
-23	182776	. SCREW, Cap, hex head (74865)	1	
-24	6029335	. NUT, Hex, self-locking(74865)	1	
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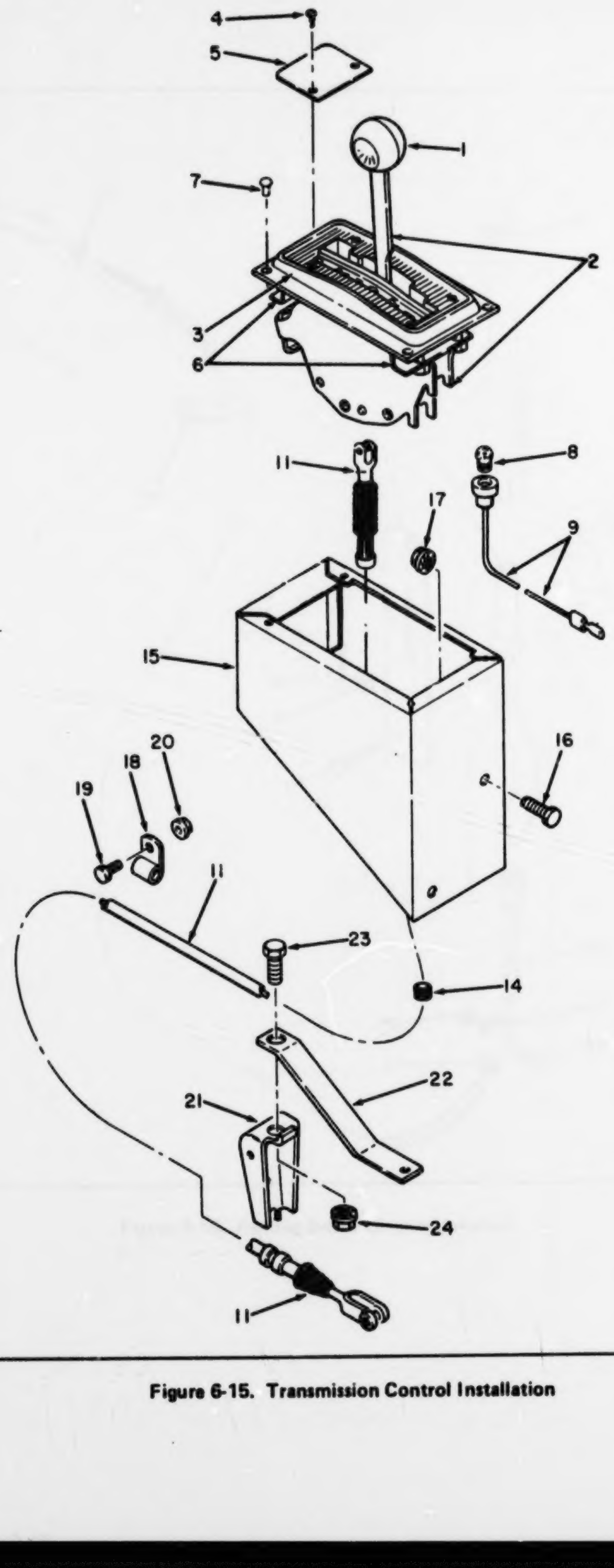
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Figure 6-15. Transmission Control Installation

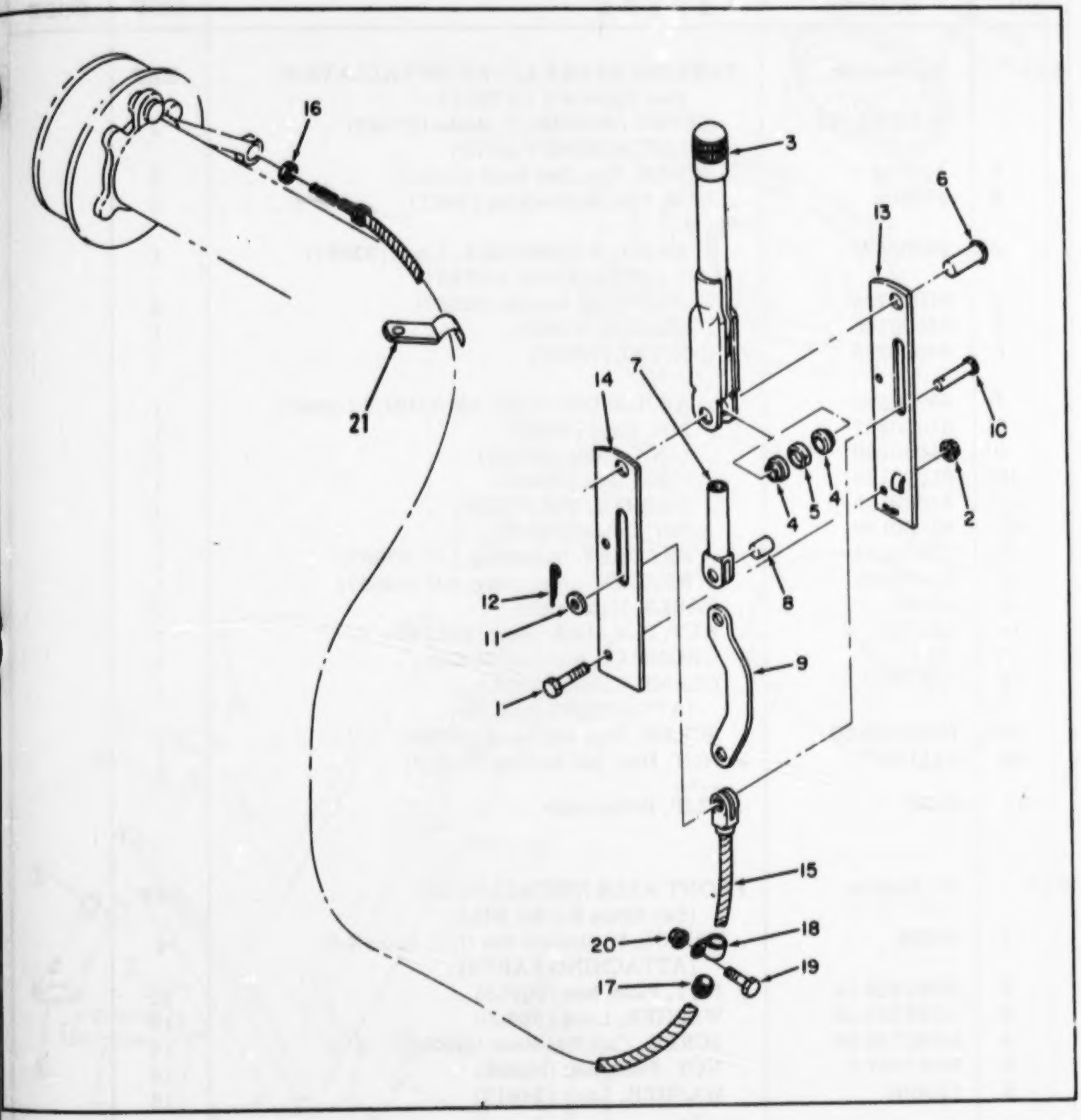
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Figure 6-16. Parking Brake Lever Installation

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-16-	No Number	PARKING BRAKE LEVER INSTALLATION	REF	
		(See figure 6-1 for NHA)		
	6110C42-682	. LEVER ASSEMBLY, Brake (92867)	1	
		(ATTACHING PARTS)		
- 1	122052	. SCREW, Cap, hex head (24617)	2	
- 2	273802	. NUT, Hex, self-locking (24617)	2	
		—*—		
- 3	95000521	. . HANDLE ASSEMBLY, Lever (92867)	1	
		(ATTACHING PARTS)		
- 4	81000239	. . BUSHING, Handle (92867)	2	
- 5	81000196	. . SPACER (92867)	1	
- 6	84000238	. . RIVET (92867)	1	
		—*—		
- 7	95000382	. . ADJUSTING TUBE ASSEMBLY (92867)	1	
- 8	81000207	. . PIN, Pivot (92867)	1	
- 9	81000200	. . LINK, Cable (92867)	1	
-10	81000129	. . PIN, Clevis (92867)	1	
-11	84000115	. . WASHER, Flat (92867)	1	
-12	84000139	. . PIN, Cotter (92867)	1	
-13	81000604	. . BRACKET, Mounting, LH (92867)	1	
-14	81000605	. . BRACKET, Mounting, RH (92867)	1	
-15	61365	. CABLE, Hand brake	1	
-16	451063	. NUT, Hex, self locking (24617)	1	
-17	2513	. GROMMET, Rubber (70485)	1	
-18	COV0813	. CLAMP, Cable (99203)	1	
		(ATTACHING PARTS)		
-19	MS90725-60	. SCREW, Cap, hex head (96906)	1	
-20	9411507	. NUT, Hex, self-locking (24617)	1	
		—*—		
-21	49442	. CLIP, Brake cable	1	
6-17-	No Number	FRONT AXLE INSTALLATION	REF	
		(See figure 6-1 for NHA)		
- 1	34226	. WHEEL, Pneumatic tire (Incl Items 4-6)	4	
		(ATTACHING PARTS)		
- 2	MS51968-14	. NUT, Plain, hex (96906)	10	
- 3	MS35338-48	. WASHER, Lock (96906)	10	
- 4	MS90725-58	. SCREW, Cap, hex head (96906)	16	
- 5	MS51967-8	. NUT, Plain, hex (96906)	16	
- 6	120382	. WASHER, Lock (24617)	16	
		—*—		
- 7	61341	. TIRE, Pneumatic, 6 ply, 6.90 x 9	2	
- 8	ZZ1550CLAGR6	. INNER TUBE, Pneumatic tire (81348)	2	
- 9	8528610	. FLAP, Wheel liner (18876)	2	

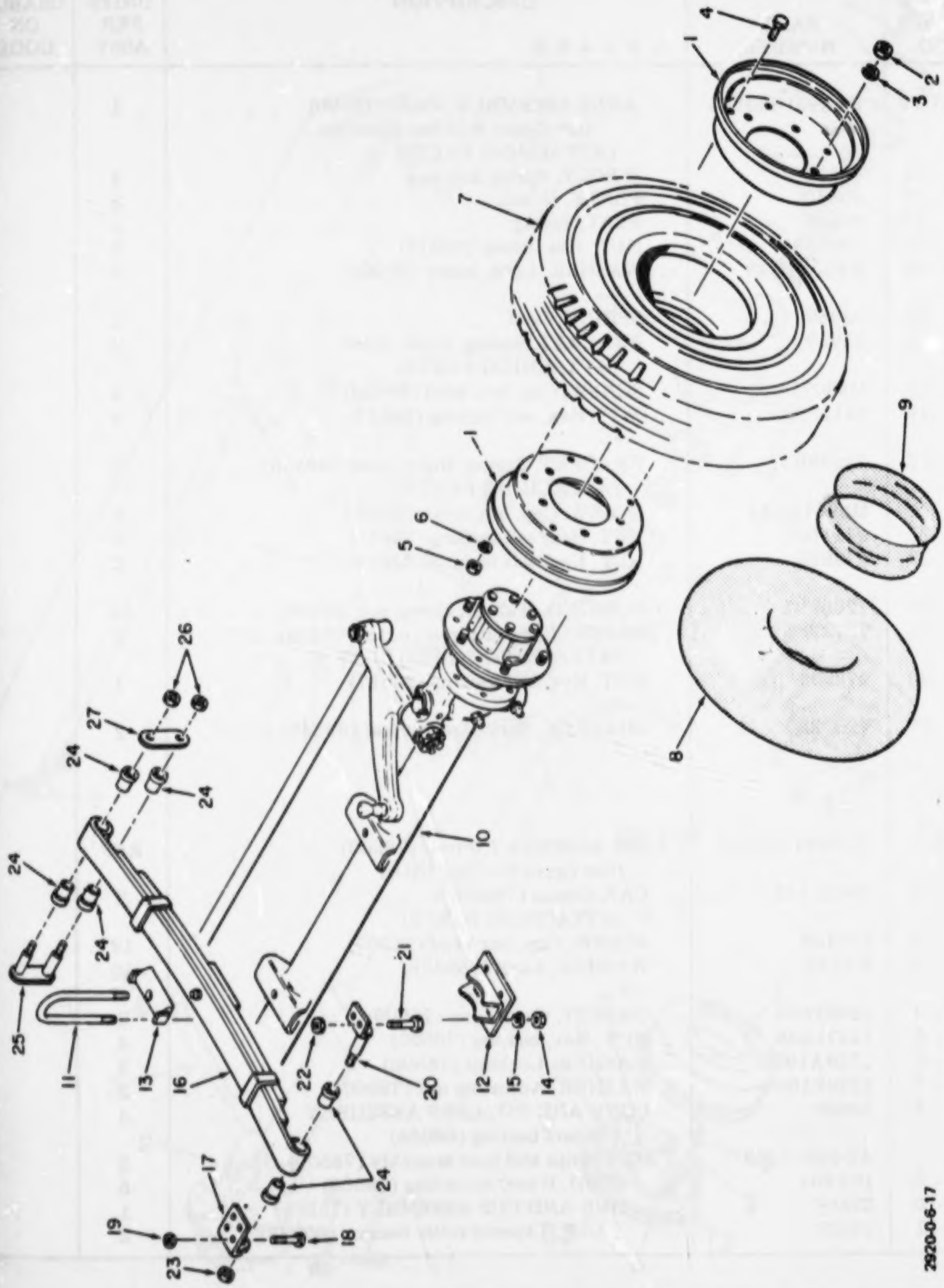
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Figure 6-17. Front Axle Installation

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-17-10	FAE951-FSHX5	. AXLE ASSEMBLY, Front (78500)	1	
		(See figure 6-18 for details)		
		(ATTACHING PARTS)		
-11	40838	. U-BOLT, Spring and axle	4	
-12	40840	. PLATE, U-bolt	2	
-13	40839	. SEAT, Spring	2	
-14	106638	. NUT, Hex, heavy (24617)	8	
-15	MS35340-48	. WASHER, Lock, heavy (96906)	8	
		---*---		
-16	33950	. SPRING, Leaf	2	
-17	31959	. BRACKET, Spring, front, outer	2	
		(ATTACHING PARTS)		
-18	MS90725-62	. SCREW, Cap, hex head (96906)	4	
-19	9411507	. NUT, Hex, self locking (24617)	4	
		---*---		
-20	72698R11	. BRACKET, Spring, front, inner (89346)	2	
		(ATTACHING PARTS)		
-21	MS90725-64	. SCREW, Cap, hex head (96906)	4	
-22	9411507	. NUT, Hex, self locking (24617)	4	
-23	272698	. NUT, Hex, self locking (24617)	2	
		---*---		
-24	72686R1	. BUSHING, Rubber, spring eye (89346)	12	
-25	72722R11	. SHACKLE, Spring, rear, outer (89346)	2	
		(ATTACHING PARTS)		
-26	272698	. NUT, Hex, self locking (24617)	4	
		---*---		
-27	72678R1	. SHACKLE, Spring, rear, inner (89346)	2	
6-18-	FAE951-FSHX5	AXLE ASSEMBLY, Front (78500)	REF	
		(See figure 6-17 for NHA)		
- 1	3262L142	. CAP, Grease (78500)	2	
		(ATTACHING PARTS)		
- 2	S2610P	. SCREW, Cap, hex head (78500)	12	
- 3	WA16Z	. WASHER, Lock (78500)	12	
		---*---		
- 4	2208F604	. GASKET, Grease cap (78500)	2	
- 5	1227L636	. NUT, Hex, bearing (78500)	4	
- 6	1229A1925	. WASHER, Locknut (78500)	2	
- 7	1229Z1924	. WASHER, Adjusting nut (78500)	2	
- 8	18590	. CONE AND ROLLERS ASSEMBLY	4	
		Wheel bearing (60038)		
	A2-333C1563	. HUB, Cups and stud assembly (78500)	2	
- 9	10X804	. . STUD, Wheel mounting (78500)	5	
-10	33552	. . HUB AND CUP ASSEMBLY (75262)	1	
-11	18520	. . . CUP, Tapered roller bearing (60038)	2	

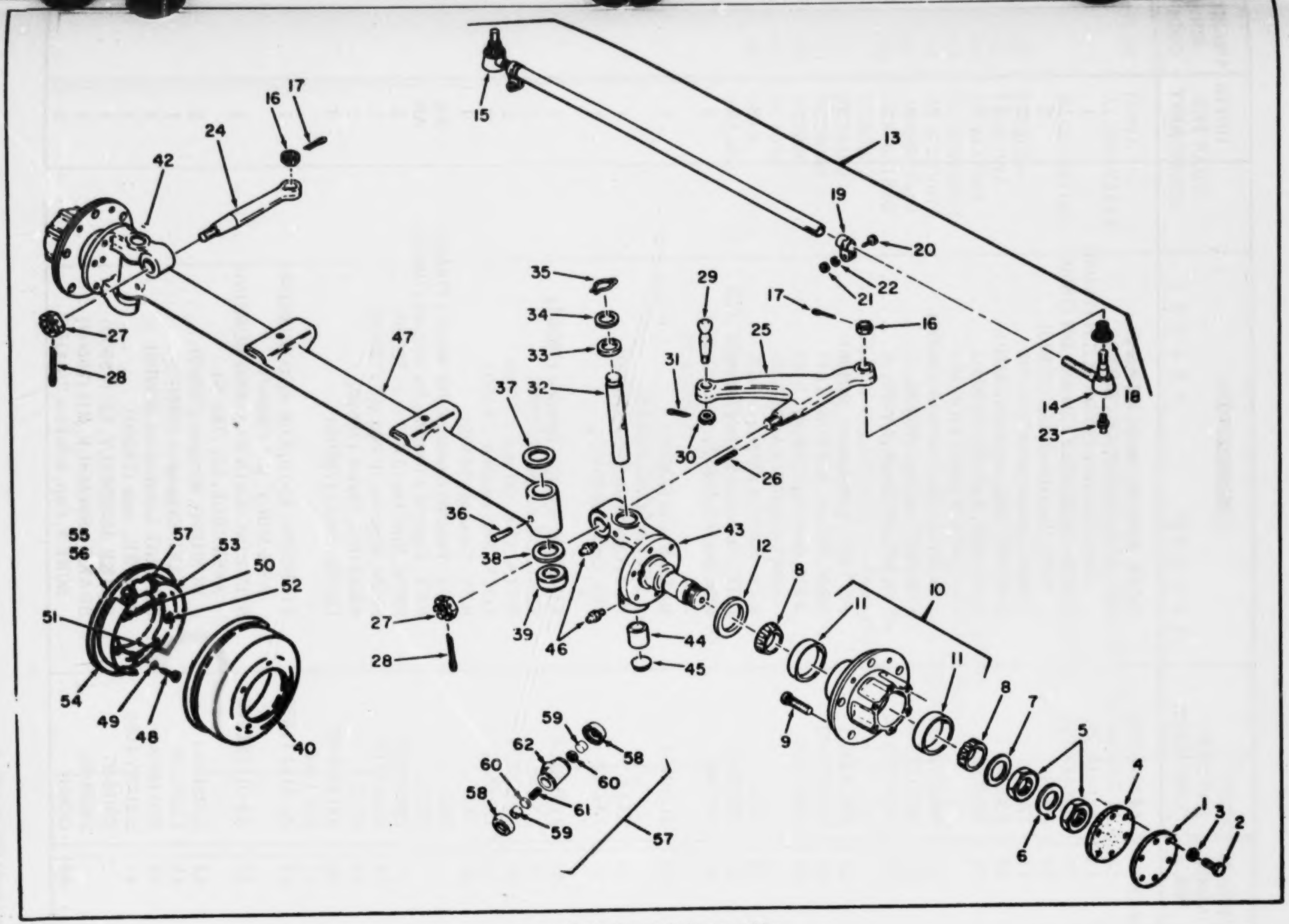
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Figure 6-18. Front Axle Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-18-12	A1205H918	. SEAL, Plain, encased (78500)		
-13	A1-3102A2757	. TIE ROD ASSEMBLY (78500)	1	
-14	A3144M351	. . END ASSEMBLY, Tie rod, LH (78500)	1	
-15	A3144N352	. . END ASSEMBLY, Tie rod, RH (78500)	1	
-16	X518	. . NUT, Castellated, hex (78500)	2	
-17	137185	. . PIN, Cotter (24617)	2	
-18	S10534	. . BOOT, Seal, rod end (72210)	2	
-19	2257Y25	. . CLAMP, Rod end (78500)	2	
		(ATTACHING PARTS)		
-20	MS90726-37	. . SCREW, Cap, hex head (96906)	2	
-21	MS51968-5	. . NUT, Plain, hex (96906)	2	
-22	MS35338-45	. . WASHER, Lock (96906)	2	
		---*---		
-23	MS15002-1	. FITTING, Lubrication (96906)	2	
-24	3133T2932	. ARM, Tie rod, RH (78500)	1	
-25	3122T852	. ARM, Steering (78500)	1	
		(ATTACHING PARTS)		
-26	X654	. KEY, Machine (78500)	2	
-27	1227R18	. NUT, Castellated, hex (78500)	2	
-28	137185	. PIN, Cotter (24617)	2	
		---*---		
-29	2110H34	. BALL STUD (78500)	1	
		(ATTACHING PARTS)		
-30	X518	. NUT, Castellated, hex (78500)	1	
-31	137185	. PIN, Cotter (24617)	1	
		---*---		
-32	3101B106	. KINGPIN, Steering knuckle (78500)	2	
-33	5X458	. SEAL, Oil, kingpin (78500)	2	
-34	1205E109	. RETAINER, Oil seal (78500)	2	
-35	1218N92	. LOCK, Seal retainer (78500)	2	
-36	7X8	. KEY, Tapered (78500)	2	
	7X9	. KEY, Tapered (oversize, for service) (78500)	AR	
	7X10	. KEY, Tapered (oversize, for service) (78500)	AR	
-37	2203F110	. SHIM, Knuckle (0.017 in.) (78500)	2	
-38	2203E109	. SHIM, Knuckle (0.006 in.) (78500)	2	
-39	T113	. BEARING, Thrust (78500)	2	
-40	3219W3091	. DRUM, Brake (78500)	2	
-41	Not Used			
-42	A1-3111T1450	. STEERING KNUCKLE AND BUSHING ASSEMBLY, RH (78500)	1	
-43	A1-3111S1449	. STEERING KNUCKLE AND BUSHING ASSEMBLY, LH (78500)	1	
-44	1225K531	. . BUSHING, Kingpin (78500)	2	
-45	1250L38	. . PLUG, Expansion (78500)	1	
-46	MS15003-1	. FITTING, Lubrication (96906)	4	
-47	A3100V4468	. CENTER, Axle (78500)	1	
	FSH8-27	. BRAKE ASSEMBLY, LH (78500)	1	
	FSH8-26	. BRAKE ASSEMBLY, RH (78500)	1	
-48	COML	. . SCREW, Cap, 3/8-16 x 7/8 GR5	8	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-18-49	COML	. . WASHER, Lock, medium, 3/8	8	
	A1-3236K1519	. . BACKING PLATE & SHOE ASSEMBLY, . . . LH (78500)	1	
	A1-3236L1520	. . BACKING PLATE & SHOE ASSEMBLY, . . . RH (78500)	1	
-50	2758H34	. . . SPRING, Shoe return (78500)	1	
-51	1718U125	. . . SPRING, Retainer clip (78500)	1	
-52	A1-245Z234	. . . LINK ASSEMBLY, Adjusting (78500). . . .	2	
-53	A1-3722X674	. . . SHOE AND LINING ASSEMBLY (78500). .	1	
-54	A1-3722V672	. . . SHOE AND LINING ASSEMBLY (78500). .	1	
-55	A3236K1519	. . . BACKING PLATE, LH (78500)	1	
-56	A3236L1520	. . . BACKING PLATE, RH (78500)	1	
-57	FD36939	. . CYLINDER ASSEMBLY, Wheel (63477) . . .	2	
-58	FC14492	. . . BOOT, Rubber (63477)	2	
-59	FC38043	. . . PISTON, Wheel cylinder (63477)	2	
-60	FC2936	. . . CUP, Piston (63477)	2	
-61	FC1936	. . . SPRING, Piston return (63477).	1	
-62	N.S.S.	. . . BODY, Wheel cylinder	1	
	FC13620	KIT, Wheel cylinder repair (63477) . . . . (includes item 61 and 2 ea. of items 58, 59 and 60.)	AR	

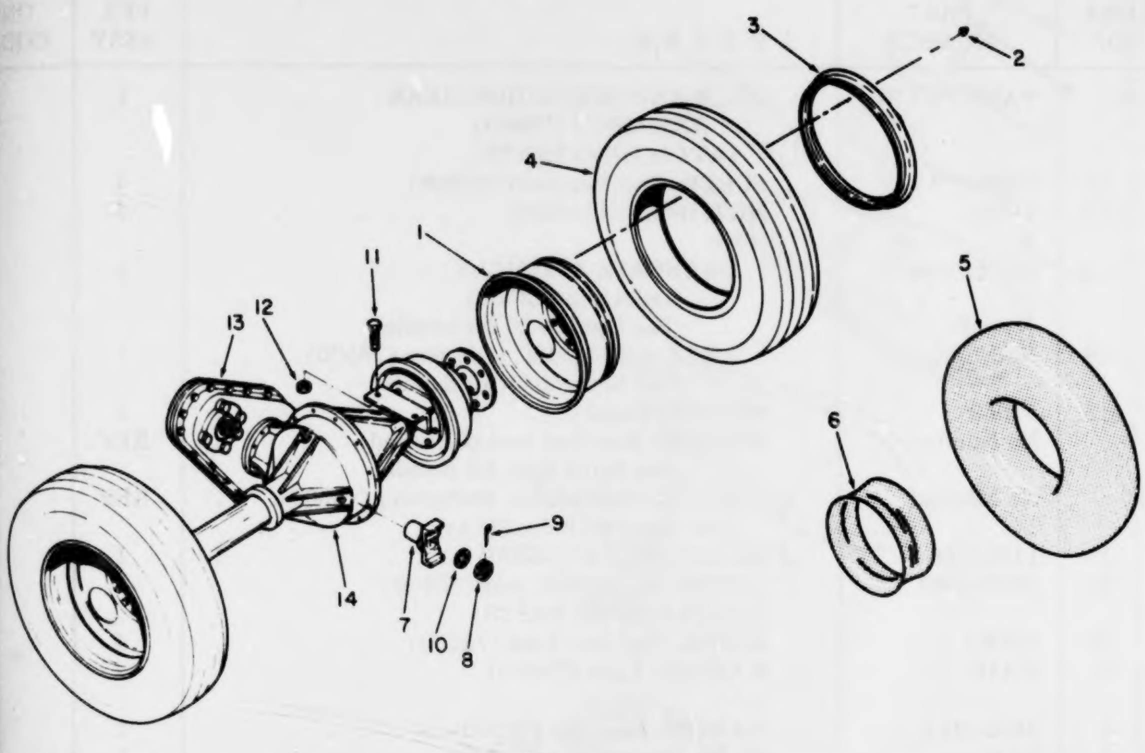

Figure 6-19. Rear Axle Installation

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-19-	No Number	REAR AXLE INSTALLATION . . . . (See figure 6-1 for NHA)	REF	
- 1	77880-1	. WHEEL, Pneumatic tire, (w/Side Ring) (09386) (ATTACHING PARTS)	2	
- 2	41233	. NUT, Hex, wheel mounting (09386) . . . . . ---*---	12	
- 3	37613-2	. RING, Side, lock (09386)	2	
- 4	61342	. TIRE, Pneumatic, 6.50x16, 6 ply	2	
- 5	MS35392-7	. INNER TUBE, Pneumatic tire (96906)	2	
- 6	835-0252	. FLAP, Pneumatic tire, 6.50x16 (83187) . . .	4	
- 7	23231J	. YOKE, Companion, axle input (76260) . . . . (ATTACHING PARTS)	1	
- 8	1227G943	. NUT, Castellated, hex (78500)	REF	
- 9	K2412	. PIN, Cotter (78500)	REF	
-10	1829T592	. WASHER, Input shaft (78500) . . . . ---*---	REF	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-19-	TA267FHX33	. AXLE AND REDUCTION GEAR ASSEMBLY (78500)	1	
		(ATTACHING PARTS)		
-11	MS90726-187	. SCREW, Cap, hex head (96906)	4	
-12	41664	. NUT, Hex, self locking	4	
		---*---		
-13	No Number	. . GEARCASE ASSEMBLY, Reduction (78500) (See figure 6-20 for details)	1	
-14	No Number	. . AXLE ASSEMBLY, w/Brakes (78500) (See figure 6-21 for details)	1	
-15	37669	. SPACER, Wheel	2	
	No Number	. SPRINGS, Rear leaf (not illustrated) (See figure 6-51 for details)	REF	
6-20-	No Number	GEARCASE ASSEMBLY, Reduction (78500). (See figure 6-19 for NHA)	REF	
-1	1199J166	. BREATHER, Oil (78500)	1	
-2	3866A989	. COVER, Input shaft, rear (78500)	1	
		(ATTACHING PARTS)		
-3	S268-1	. SCREW, Cap, hex head (78500)	4	
-4	WA16	. WASHER, Lock (78500)	4	
		---*---		
-5	2808C913	. GASKET, Rear cap (78500).	1	
-6	P-18	. PLUG, Pipe, oil filler (78500)	1	
-7	N.S.S.	. COVER, Gearcase (78500) (Serviced only with item 25 Case under part no. A3-3875A651)	1	
		(ATTACHING PARTS)		
-8	S1612-1	. BOLT, Hex head (78500)	15	
-9	N16-1	. NUT, Hex (78500)	15	
-10	WA16	. WASHER, Lock (78500)	15	
		---*---		
-11	2808X622	. GASKET, Gearcase cover (78500)	1	
-12	3892X1142	. GEAR, Spur, 57 Teeth (78500)	1	
-13	A1-1805V204	. SEAL AND RETAINER ASSEMBLY (78500)	1	
-14	A-1805B262	. . SEAL, Plain, encased (78500)	1	
-15	1846C159	. DOWEL, Cover (78500)	2	
-16	1250U125	. PLUG, Magnetic drain (78500)	1	
-17	43207	. BEARING, Ball (43334)	1	
-18	1854M169	. RING, Retaining (78500)	1	
-19	1227G943	. NUT, Lock, hex (78500)	1	
-20	1829T592	. WASHER, Flat (78500)	1	
-21	Not Used			
-22	3892C4163	. GEAR, Drive 19 Teeth (78500)	1	
-23	3207	. BEARING, Ball (43334)	1	
-24	A1805R96	. SEAL, Plain, encased (78500)	1	

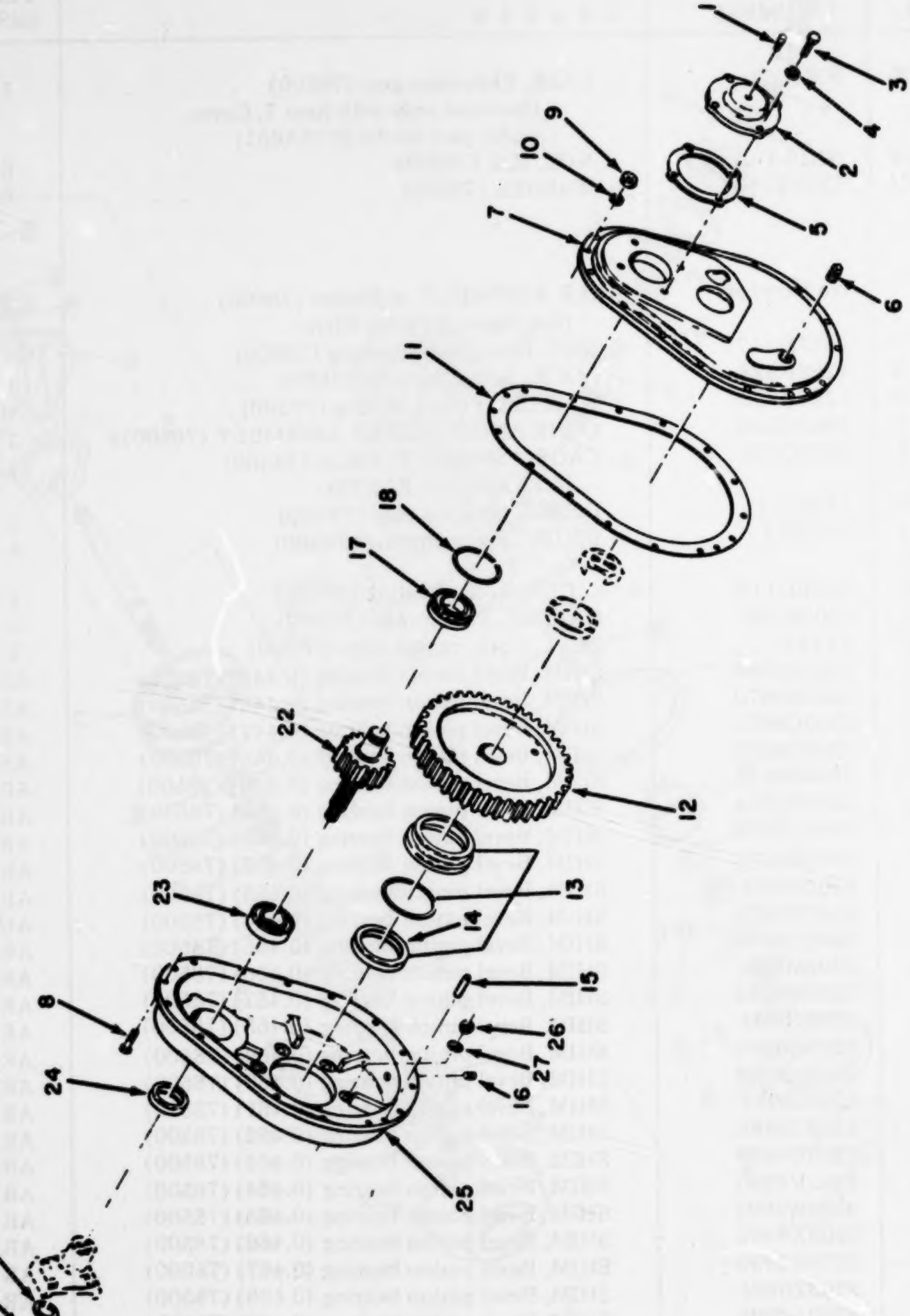
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Figure 6-20. Reduction Gearcase Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-20-25	N.S.S.	. CASE, Reduction gear (78500)	1	
		(Serviced only with item 7, Cover, under part no A3-3875A651)		
-26	NL19-1	. NUT, Hex (78500)	6	
-27	1229Y1507	. WASHER (78500)	6	
6-21-	No Number	AXLE ASSEMBLY, w/Brakes (78500)	REF	
		(See figure 6-19 for NHA)		
- 1	1227M117	. NUT, Hex, pinion bearing (78500)	2	
- 2	1229H528	. LOCK, Adjusting nut (78500)	1	
- 3	1229G813	. WASHER, Pinion bearing (78500)	1	
- 4	HM803149	. CONE AND ROLLERS ASSEMBLY (78500)	1	
- 5	3226C679	. CAGE ASSEMBLY, Pinion (78500)	1	
		(ATTACHING PARTS)		
- 6	1246C211	. DOWEL, Bearing cage (78500)	1	
- 7	SN920-1	. STUD, Cage mounting (78500)	6	
		---*---		
- 8	HM803110	. . CUP, Roller bearing (78500)	1	
- 9	2808F942	. GASKET, Pinion cage (78500)	1	
- 9A	5X424	. SEAL, Cork, pinion cage (78500)	1	
-10	2203A6969	. SHIM, Bevel pinion bearing (0.445) (78500)	AR	
	2203B6970	. SHIM, Bevel pinion bearing (0.446) (78500)	AR	
	2203C6971	. SHIM, Bevel pinion bearing (0.447) (78500)	AR	
	2203D6972	. SHIM, Bevel pinion bearing (0.448) (78500)	AR	
	2203E6973	. SHIM, Bevel pinion bearing (0.449) (78500)	AR	
	2203F6974	. SHIM, Bevel pinion bearing (0.450) (78500)	AR	
	2203G6975	. SHIM, Bevel pinion bearing (0.451) (78500)	AR	
	2203H6976	. SHIM, Bevel pinion bearing (0.452) (78500)	AR	
	2203J6978	. SHIM, Bevel pinion bearing (0.453) (78500)	AR	
	2203K6979	. SHIM, Bevel pinion bearing (0.454) (78500)	AR	
	2203L6980	. SHIM, Bevel pinion bearing (0.455) (78500)	AR	
	2203M6981	. SHIM, Bevel pinion bearing (0.456) (78500)	AR	
	2203N6982	. SHIM, Bevel pinion bearing (0.457) (78500)	AR	
	2203P6984	. SHIM, Bevel pinion bearing (0.458) (78500)	AR	
	2203Q6985	. SHIM, Bevel pinion bearing (0.459) (78500)	AR	
	2203R6986	. SHIM, Bevel pinion bearing (0.460) (78500)	AR	
	2203S6987	. SHIM, Bevel pinion bearing (0.461) (78500)	AR	
	2203T6988	. SHIM, Bevel pinion bearing (0.462) (78500)	AR	
	2203U6989	. SHIM, Bevel pinion bearing (0.463) (78500)	AR	
	2203V6990	. SHIM, Bevel pinion bearing (0.464) (78500)	AR	
	2203W6991	. SHIM, Bevel pinion bearing (0.465) (78500)	AR	
	2203X6992	. SHIM, Bevel pinion bearing (0.466) (78500)	AR	
	2203Y6993	. SHIM, Bevel pinion bearing (0.467) (78500)	AR	
	2203Z6994	. SHIM, Bevel pinion bearing (0.468) (78500)	AR	
	2203A6995	. SHIM, Bevel pinion bearing (0.469) (78500)	AR	

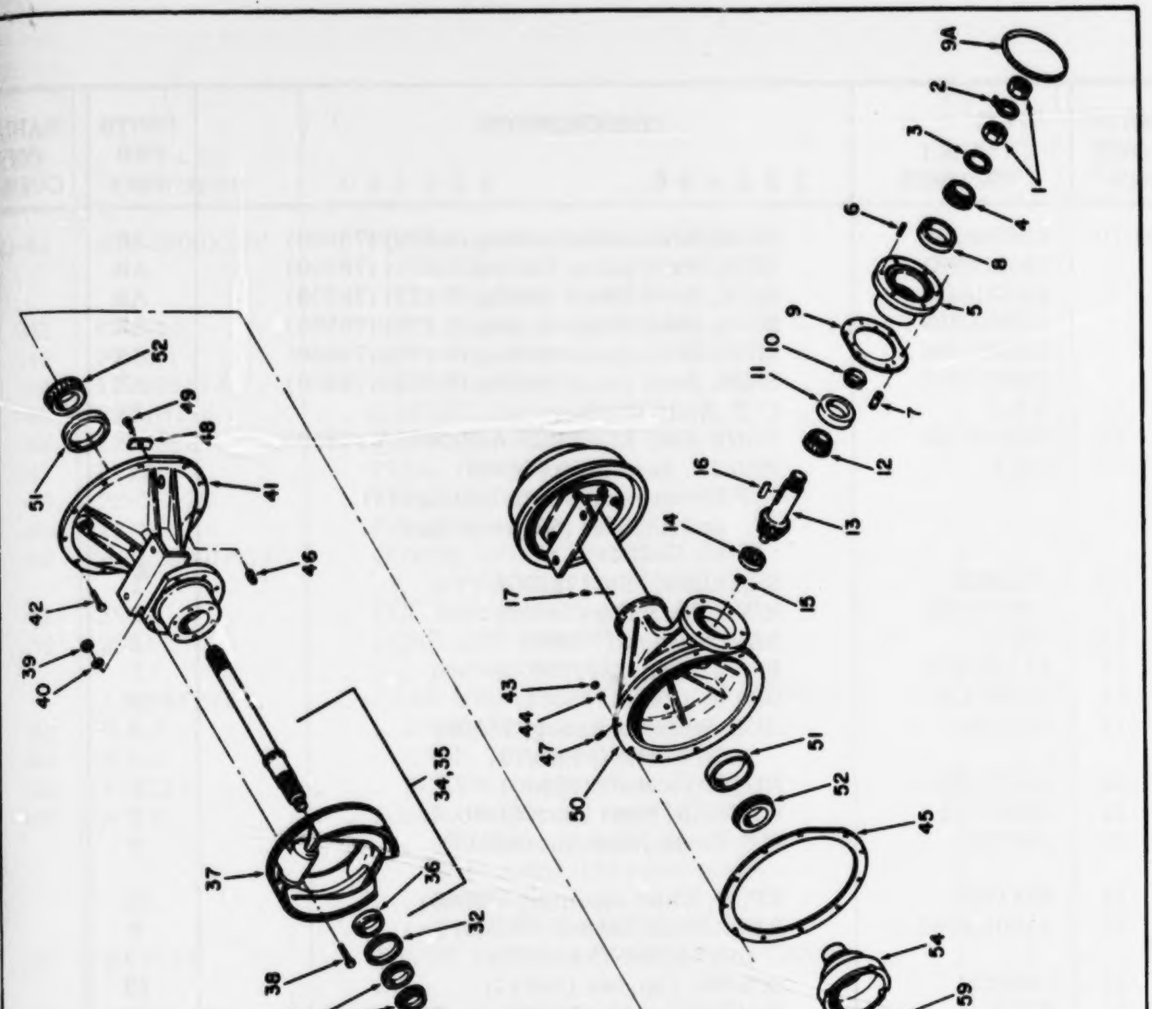
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Figure 6-21. Axle Assembly with Brakes

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-21-10	2203B6996	. SHIM, Bevel pinion bearing (0.470) (78500)	AR	
	2203C6997	. SHIM, Bevel pinion bearing (0.471) (78500)	AR	
	2203D6998	. SHIM, Bevel pinion bearing (0.472) (78500)	AR	
	2203E6999	. SHIM, Bevel pinion bearing (0.473) (78500)	AR	
	2203F7000	. SHIM, Bevel pinion bearing (0.474) (78500)	AR	
	2203G7001	. SHIM, Bevel pinion bearing (0.475) (78500)	AR	
-11	N.S.S.	. CUP, Roller Bearing	1	
-12	HM803149	. CONE AND ROLLERS ASSEMBLY (78500)	1	
-13	N.S.S.	. PINION, Bevel drive (78500) (Serviced only with bearing (14) and ring gear (56) under part no. 34454)	1	
-14	1228E83	. BEARING, Pilot (78500)	1	
-15	1229Y1299	. RING, Retaining (78500)	1	
-16	16X71	. KEY, Machine (78500)	1	
-17	A1199J166	. BREATHER, Oil (78500)	1	
-18	3819W439	. DRUM, Brake (78500)	2	
-19	311D264	. HUB, Wheel mounting (78500)	2	
		(ATTACHING PARTS)		
-20	1227N496	. NUT, Axle shaft (78500)	2	
-21	1829U775	. WASHER, Shaft nut (78500)	2	
-22	103390	. PIN, Cotter, shaft nut (25617)	2	
		---*---		
-23	20X1037	. STUD, Wheel mounting (78500)	12	
-24	A1805N560	. RETAINER, Oil seal (78500)	2	
		(ATTACHING PARTS)		
-25	186622	. SCREW, Cap, hex (24617)	12	
-26	WA16	. WASHER, Lock (78500)	12	
		---*---		
-27	A1805U307	. . SEAL, Oil (78500)	1	
	2808V672	. GASKET, Retainer (78500)	2	
-28	1244A261	. RETAINER, Axle shaft bearing (78500)	2	
-29	2803S2099	. SHIM, Axle shaft bearing, 0.003 in (78500)	4	
-30	2803T2100	. SHIM, Axle shaft bearing, 0.005 in. (78500)	6	
-31	2803U2101	. SHIM, Axle shaft bearing, 0.010 in. (78500)	4	
-32	18720	. CUP, Tapered roller bearing (60038)	4	
-33	18790	. CONE AND ROLLERS ASSEMBLY (60038)	4	
-34	A3802C1251	. SHAFT, Axle, short (LH) (78500)	1	
-35	A3802D1252	. SHAFT, Axle, long (RH) (78500)	1	
-36	1874E187	. . COLLAR, Spacer (78500)	1	
-37	FSH12-126	. BRAKE ASSEMBLY (78500) (See figure 6-22 for details)	2	
		(ATTACHING PARTS)		
-38	455014	. BOLT, Brake mounting (24617)	12	
-39	214442	. NUT, Hex (24617)	12	
-40	103324	. WASHER, Lock (24617)	12	

FIG. & NDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
-21-41	A50-3800X570	. COVER AND HOUSING TUBE ASSEMBLY, LH (78500)	1	
		(ATTACHING PARTS)		
-42	S1714-1	. BOLT, Carrier flange (78500)	11	
-43	NL17-1	. NUT, Hex, carrier flange (78500)	11	
-44	1229E1513	. WASHER (78500)	11	
-45	2208H112	. GASKET, Carrier (78500)	1	
-46	1250S123	. PLUG, Drain (78500)	1	
-47	P112	. PLUG, Filler (78500)	1	
-48	2297S175	. THRUST BLOCK, Bevel gear (78500)	1	
-49	1246D134	. PIN, Thrust block (78500)	1	
-50	A20-3800D654	. COVER AND HOUSING TUBE ASSEMBLY, RH (78500)	1	
-51	3920	. CUP, Differential bearing (60038)	2	
-52	3984	. CONE AND ROLLERS, Differential bearing (60038)	2	
	A3235F214	. CASE ASSEMBLY, Differential (78500)	1	
-53	N.S.S.	. . CASE, Flange half (78500)	1	
-54	N.S.S.	. . CASE, Tongue half (78500)	1	
-55	S2822-1	. . SCREW, Cap, hex head (78500)	8	
-56	N.S.S.	. GEAR, Differential ring (78500) (Serviced only with pinion (13) and bearing (14) under part no. 34454)	1	
		(ATTACHING PARTS)		
-57	RV7712	. RIVET, Differential case and gear (78500)	12	
		---*---		
-58	2234K427	. GEAR, Differential side (78500)	2	
-59	1229V412	. WASHER, Thrust (78500)	2	
-60	2233M429	. PINION, Differential (78500)	4	
-61	1229U1061	. WASHER, Thrust (78500)	4	
-62	3278T72	. SPIDER, Differential (78500)	1	
	MPS-2260	. CAGE, Bearings & shim package (78500) (includes items 4, 5, 6, 10, 11, and 12)	AR	

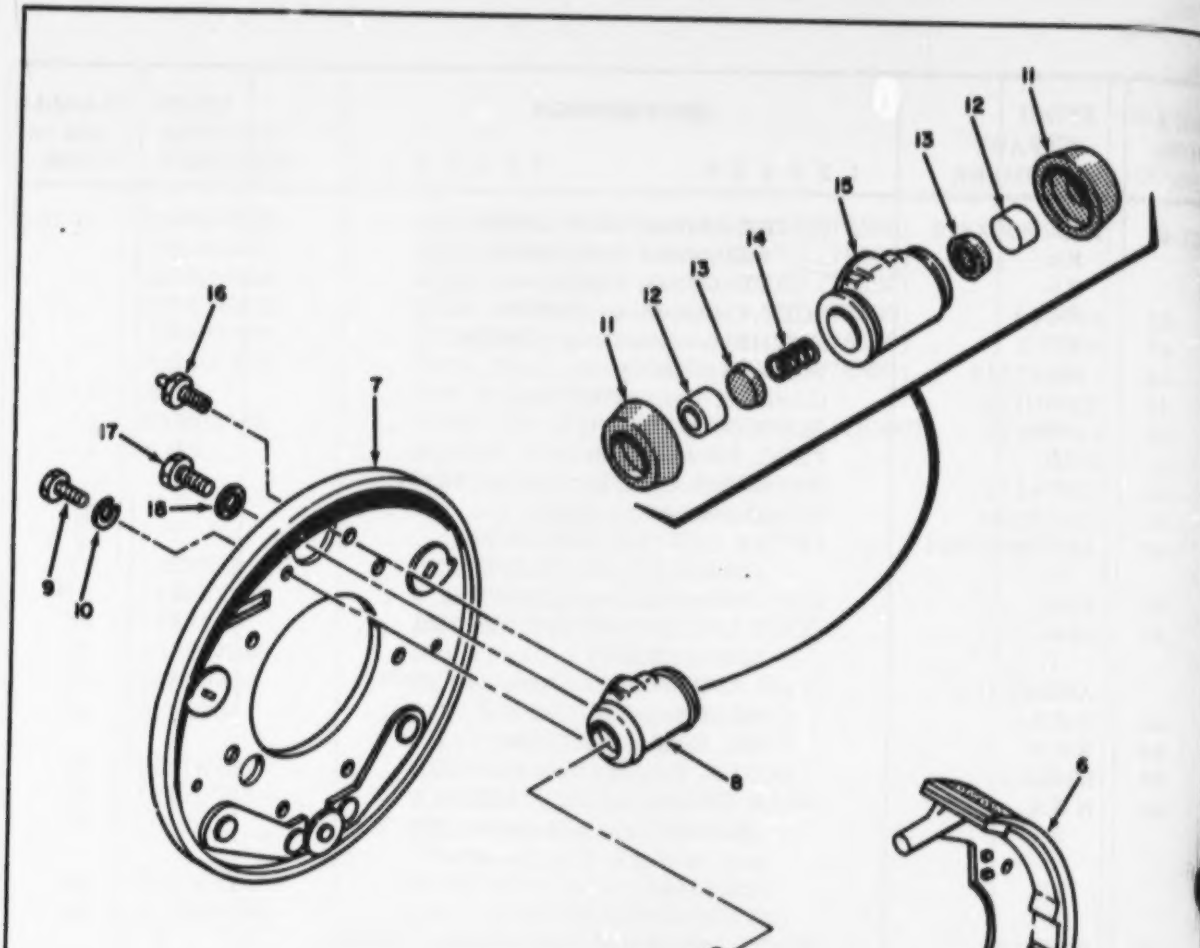
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Figure 6-22. Brake Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-22-	FSH12-126	BRAKE ASSEMBLY (78500) (See figure 6-21 for NHA)	REF	
-1	1718D108	. SPRING, Retainer clip (78500)	1	
-2	2758R18	. SPRING, Shoe return (78500)	1	
-3	1807-A-1	. CUP WASHER, Hold-down (78500)	4	
-4	2858M91	. SPRING, Hold-down (78500)	2	
-5	1779W49	. NAIL, Hold-down (78500)	2	
-6	A3722D134	. SHOE AND LINING ASSEMBLY (78500)	2	
	2740B938	. . LINING, Brake (78500) (N.S.S.)	2	
-7	A8-3736H112	. BACKING PLATE ASSEMBLY (78500)	1	
-8	FD21083	. CYLINDER ASSEMBLY, Wheel (63477) (ATTACHING PARTS)	1	
-9	S267	. SCREW, Cap, hex (78500)	2	
-10	WA16	. WASHER, Lock (78500) ---*---	2	
-11	FC2991	. . BOOT, Rubber (63477)	2	
-12	FC856	. . PISTON, Wheel cylinder (63477)	2	
-13	FC857	. . CUP, Piston (63477)	2	
-14	FC860	. . SPRING, Piston return (63477)	1	
-15	N.S.S.	. . BODY, Cylinder (63477)	1	
-16	FC11596	. . SCREW, Bleeder (63477)	1	
-17	FC2832	. . BOLT, Connector (63477)	1	
-18	FC602	. . GASKET, Connector bolt (63477)	1	
6-22-	FC3607	KIT, Wheel cylinder repair (63477) (includes 2 ea. of items 11 and 13)	AR	

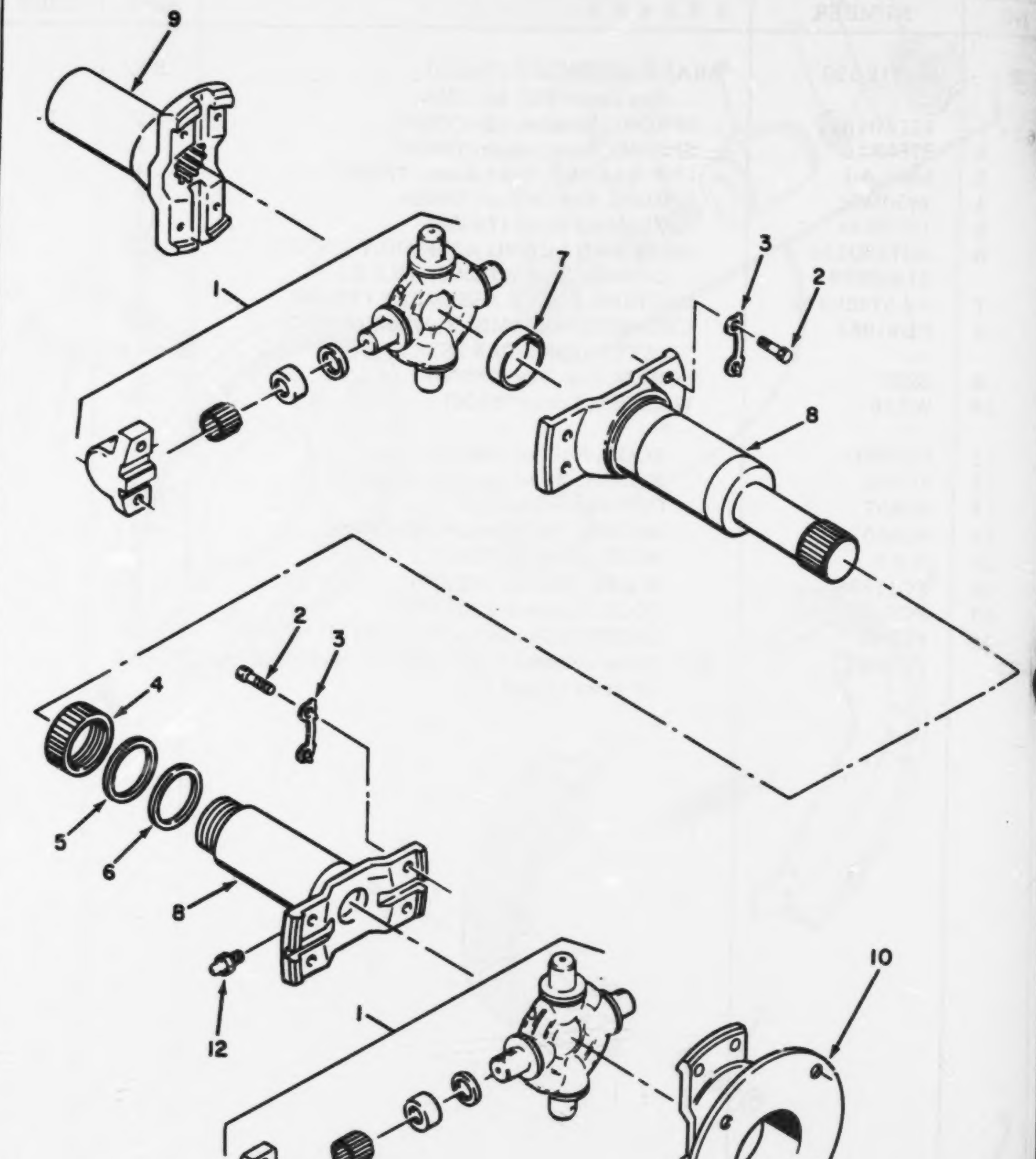
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Figure 6-23. Drive Shaft Group

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-23-	No Number	DRIVE SHAFT GROUP (See figure 6-1 for NHA)	REF	
	2A14003-11	. PROPELLER SHAFT ASSEMBLY (76260)	1	
- 1	114-3100	. . JOINT ASSEMBLY, Universal (76260) (ATTACHING PARTS)	2	
- 2	MS90726-32	. . SCREW, Cap (96906)	8	
- 3	3549J	. . PLATE, Lock (76260) ---*---	4	
	643000	. . YOKE ASSEMBLY, Slip (76260)	1	
- 4	901J	. . . RETAINER, Felt (76260)	1	
- 5	900J	. . . WASHER, Felt (76260)	2	
- 6	6X105	. . . WASHER, Felt (76260)	1	
- 7	3568J	. . . CUP, Dust (76260)	1	
- 8	42-14003-11	. . . SHAFT ASSEMBLY, Slip (76260)	1	
- 9	23231J	. YOKE, Drive axle (76260)	REF	
-10	22688J	. YOKE, Splined, transmission (76260) (ATTACHING PARTS)	REF	
-11	Not Used			
-12	MS15003-1	. FITTING, Lubrication (96906)	1	

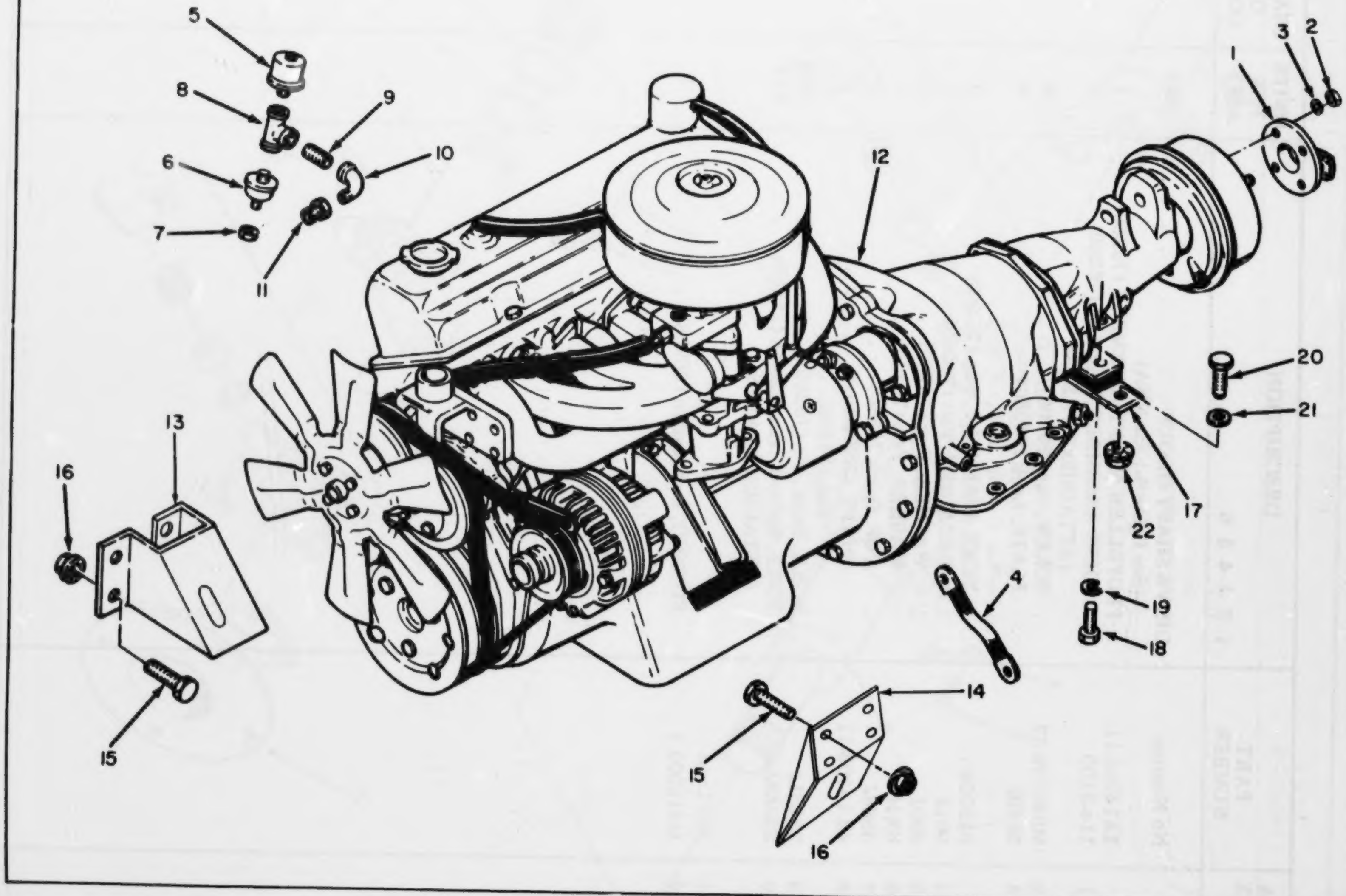
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Figure 6-24. Engine-Transmission Installation

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-24-	No Number	ENGINE-TRANSMISSION INSTALLATION (See figure 6-1 for NHA)	REF	
- 1	22688J	. YOKE, Transmission (76360)	1	
		(ATTACHING PARTS)		
- 2	120369	. NUT, Hex (24617)	4	
- 3	120382	. WASHER, Lock (24617)	4	
		---*---		
- 4	70894	. CABLE, Ground (70903)	1	
- 5	MI1425	. SWITCH, Hourmeter(74400)	1	
- 6	6460032	. SENDER, Oil pressure (70040)	1	
- 7	MS21044N3	. NUT, Hex, self locking (96906)	2	
- 8	144082	. TEE, Pipe (24617)	1	
- 9	192032	. NIPPLE, Pipe (24617)	1	
-10	127960	. ELBOW, Street (24617)	1	
-11	119923	. BUSHING, Reducing (24617)	1	
-12	48367	. ENGINE-TRANSMISSION ASSEMBLY (See figure 6-25 for details)	1	
-13	49931	. MOUNT, Engine, RH	1	
-14	49930	. MOUNT, Engine LH	1	
		(ATTACHING PARTS)		
-15	180147	. SCREW, Cap, hex head (24617)	8	
-16	9415185	. NUT, Hex, self locking (24617)	8	
		---*---		
-17	3632984	. INSULATOR, Transmission mount (74865)	1	
		(ATTACHING PARTS)		
-18	122253	. SCREW, Cap, hex head (24617)	2	
-19	120283	. WASHER, Lock (24617)	2	
-20	122145	. SCREW, Cap, hex head (24617)	2	
-21	120388	. WASHER, Flat (24617)	2	
-22	9411507	. NUT, Hex, self locking (24617)	2	
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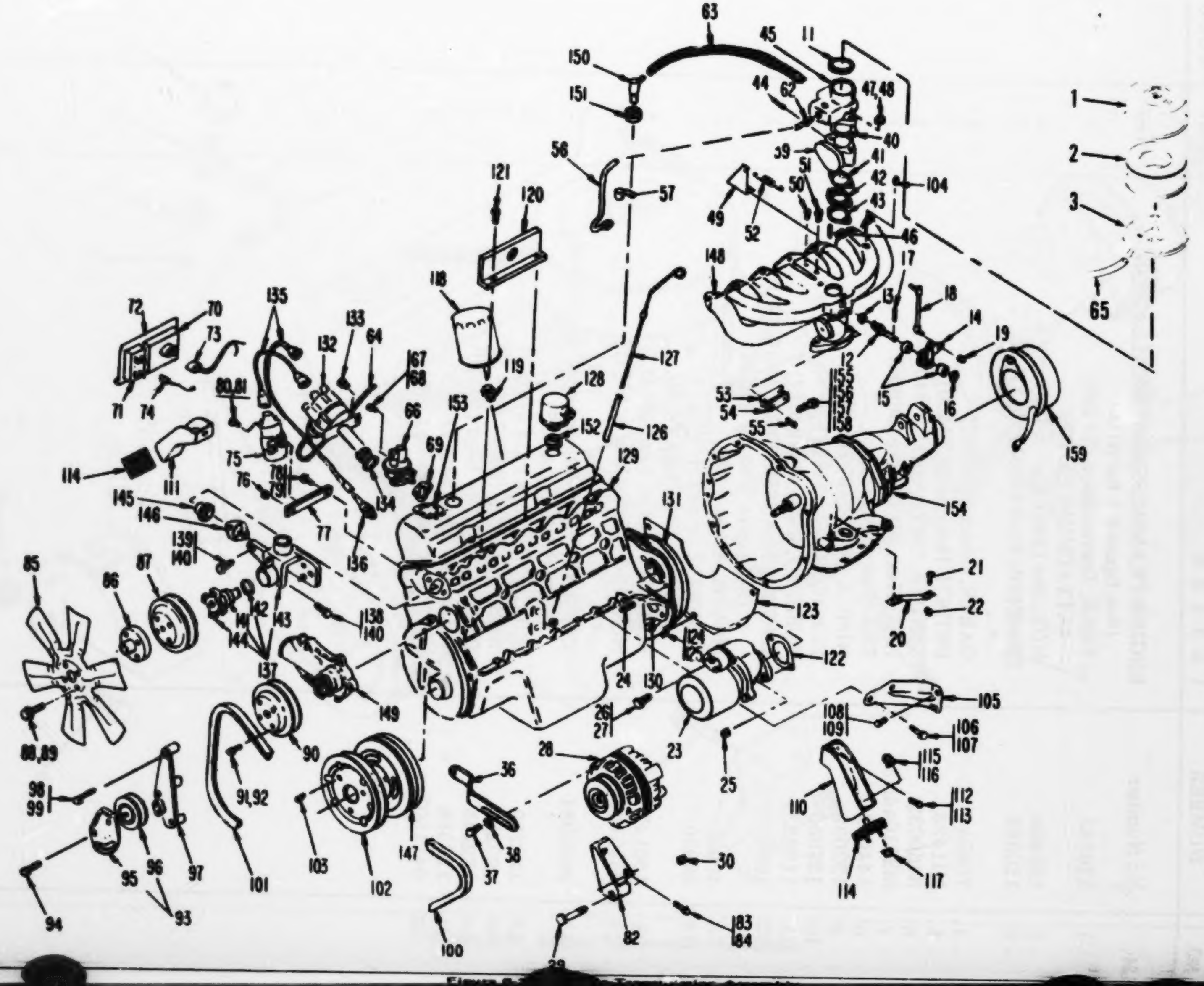
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FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-25-	48367	ENGINE TRANSMISSION GENERAL . . . . . ASSEMBLY	REF	
	B-1B18	. AIR CLEANER, Dry (78940)	1	
-1	539B3K11	. . CAP, Top (78940)	1	
-2	250A13	. . ELEMENT, Filter (78940)	1	
-3	1202B3K01	. . LOWER HALF ASSEMBLY (78940)	1	
-4	Not Used		1	
-5	Not Used			
-6	Not Used			
-7	Not Used			
-8	Not Used			
-9	Not Used			
-10	Not Used			
-11	1947797	. GASKET, Air cleaner to carburetor	1	
-12	2658286	. STUD, Accelerator control bellcrank (74865) . .	1	
-13	120382	. WASHER, Lock (24617)	1	
-14	1936052	. BELLCRANK, Accelerator control engine . . . (74865)	1	
-15	46265	. SPACER, Bellcrank	2	
-16	120394	. WASHER, Flat (24617)	1	
-17	103373	. PIN, Cotter (24617)	1	
-18	2226041	. ROD ASSEMBLY, Bellcrank to carburetor . . . (74865)	1	
		(ATTACHING PARTS)		
-19	120367	. NUT AND LOCKWASHER ASSEMBLY . . . (74865)	2	
		—*—		
-20	44482	. BRACKET, Transmission throttle lever	1	
		(ATTACHING PARTS)		
-21	121887	. CAPSCREW, Hex head (24617)	1	
-22	9416918	. NUT, Hex flange (24617)	1	
		—*—		
-23	4091975	. STARTER MOTOR ASSEMBLY (74865) . . . (See figure 6-30 for breakdown)	1	
		(ATTACHING PARTS)		
-24	2095875	. STUD (74865)	1	
-25	9415185	. NUT, Hex flange (24617)	1	
-26	122279	. CAPSCREW, Hex head (24617)	1	
-27	120383	. WASHER, Lock (24617)	1	
		—*—		
-28	4091565	. ALTERNATOR ASSEMBLY (74865) . . . . . . (See figure 6-27 for breakdown)	1	
		(ATTACHING PARTS)		
-29	433116	. CAPSCREW, Hex head (74865)	1	
-30	9417668	. NUT, Hex, self locking (74865)	1	
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FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-25-31	Not Used			
-32	Not Used			
-33	Not Used			
-34	Not Used			
-35	Not Used			
-36	2125784	. STRAP, Alternator adjusting (74865)	1	
		(ATTACHING PARTS)		
-37	122007	. CAPSCREW, Hex head (24617)	1	
-38	120395	. WASHER, Flat (24617)	1	
		---*---		
	48206	. ENGINE-TRANSMISSION ASSEMBLY	1	
-39	2406065	. . GOVERNOR, Engine (74865)	1	
	618052	. . SEAL, Governor adjuster (74865)	1	
-40	2205903	. . GASKET, Carburetor to spacer (74865) . . .	1	
-41	2205903	. . GASKET, Governor to spacer (74865) . . .	1	
-42	2406063	. . SPACER, Carburetor (74865)	1	
-43	2951889	. . GASKET, Governor to manifold (74865) . .	1	
-44	143932	. . PLUG, Governor (24617)	2	
-45	BBS6220S	. . CARBURETOR (71500)	1	
		(See figure 6-26 for breakdown)		
		(ATTACHING PARTS)		
-46	103206	. . STUD (74865)	2	
-47	120369	. . NUT, Hex (24617)	2	
-48	120382	. . WASHER, Lock (24617)	2	
		---*---		
-49	3641045	. . BRACKET, Throttle return spring (74865) . .	1	
		(ATTACHING PARTS)		
-50	6028174	. . SCREW AND WASHER ASSEMBLY . . . . (74865)	1	
-51	273306	. . SCREW, Self tapping (24617)	1	
		---*---		
-52	3492454	. . SPRING, Throttle return (74865)	1	
-53	3671425	. . GASKET, EGR hole cover (74865)	1	
-54	3671447	. . COVER, EGR hole (74865)	1	
		(ATTACHING PARTS)		
-55	181087	. . SCREW, Cap, hex head (74865)	2	
		---*---		
-56	4115473	. . TUBE, Fuel pump to carburetor (74865) . .	1	
		(ATTACHING PARTS)		
-57	2406151	. . CLIP, Tube (74865)	1	
		---*---		
-58	Not Used			
-59	Not Used			
-60	Not Used			
-61	Not Used			
-62	2406152	. . TUBE, Filter to carburetor (74865)	1	
-63	41889-13	. . HOSE, PCV valve to carburetor	1	
-64	42146-33	. . HOSE, Distributor to carburetor	1	

FIG. & NDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
-25-65	48310-12	. . HOSE, Crankcase breather to air cleaner	1	
-66	2946434	. . PUMP, Fuel (74865) (ATTACHING PARTS)	1	
-67	120233	. . CAPSCREW, Hex head (24617)	2	
-68	120382	. . WASHER, Lock (24617) ---*---	2	
-69	2843770	. . GASKET, Fuel pump (74865)	1	
-70	3874020	. . CONTROL UNIT, Electronic ignition (74865).	1	
-71	3874767	. . RESISTOR, Ballast (74865)	1	
-72	3675578	. . BRACKET, Control unit and resistor mounting (74865)	1	
-73	62039	. . HARNESS, Electronic ignition wiring	1	
-74	3675881	. . CABLE ASSEMBLY, Electronic ignition (74865)	1	
-75	3874001	. . COIL, Ignition (74865) (ATTACHING PARTS)	1	
-76	273802	. . NUT, Hex flange (24617) ---*---	1	
-77	2125706	. . BRACKET, Coil mounting (74865) (ATTACHING PARTS)	1	
-78	122119	. . CAPSCREW, Hex head (24617)	1	
-79	120382	. . WASHER, Lock (24617)	1	
-80	122007	. . CAPSCREW, Hex head (24617)	1	
-81	120214	. . WASHER, Lock (24617) ---*---	1	
-82	2125782	. . BRACKET, Alternator mounting (74865) (ATTACHING PARTS)	1	
-83	122253	. . CAPSCREW, Hex head (24617)	2	
-84	120383	. . WASHER, Lock (24617) ---*---	2	
-85	1924763	. . FAN, Engine cooling (74865)	1	
-86	1672642	. . SPACER, Fan (74865).	1	
-87	2202666	. . PULLEY, Fan (74865). (ATTACHING PARTS)	1	
-88	181096	. . CAPSCREW, Hex head (74865)	4	
-89	6022185	. . WASHER, Lock (74865) ---*---	4	
-90	2202666	. . PULLEY, Water pump (74865) (ATTACHING PARTS)	1	
-91	181086	. . CAPSCREW, Hex head (74865)	4	
-92	6022185	. . WASHER, Lock (74865) ---*---	4	
-93	3619997	. . BRACKET AND PULLEY ASSEMBLY, Idler (74865) (ATTACHING PARTS)	1	
-94	6022258	. . SCREW AND WASHER ASSEMBLY (74865). ---*---	2	
-95	3619996	. . . BRACKET, Idler pulley (74865)	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-25-96	3830196	. . . PULLEY ASSEMBLY, Idler (74865) . . .	1	
-97	2125785	. . BRACKET, Idler mounting (74865)	1	
		(ATTACHING PARTS)		
-98	122077	. . CAPSCREW, Hex head (24617)	3	
-99	120214	. . WASHER, Lock (24617)	3	
		---*---		
-100	3671074	. . BELT, Fan and alternator drive (74865) . . .	1	
-101	4027319	. . BELT, Water pump and idler drive (74865) . .	1	
-102	4095536	. . PULLEY, Fan and alternator drive (74865) . .	1	
		(ATTACHING PARTS)		
-103	6025066	. . CAPSCREW, Hex head (74865)	3	
		---*---		
-104	444626	. . PLUG, Pipe (74865).	1	
-105	1949701	. . STRUT, Block to transmission (74865) . . .	1	
		(ATTACHING PARTS)		
-106	122253	. . CAPSCREW, Hex head (24617)	2	
-107	120383	. . WASHER, Lock (24617)	2	
-108	120233	. . CAPSCREW, Hex head (24617)	2	
-109	120382	. . WASHER, Lock (24617)	2	
		---*---		
-110	2235112	. . SUPPORT, Engine, LH (74865)	1	
-111	1938486	. . SUPPORT, Engine, RH (74865)	1	
		(ATTACHING PARTS)		
-112	180145	. . CAPSCREW, Hex head (24617)	4	
-113	120383	. . WASHER, Lock (24617)	4	
		---*---		
-114	2264675	. . INSULATOR, Engine front (74865)	2	
		(ATTACHING PARTS)		
-115	2202834	. . NUT, Hex, self locking (74865)	2	
-116	2128774	. . WASHER, Flat (74865)	2	
-117	274643	. . NUT, Hex flange (24617).	4	
		---*---		
-118	3549957	. . FILTER, Oil (74865)	1	
-119	3577848	. . PIPE, Stand (74865)	1	
-120	2125749	. . BRACKET, Engine lift (74865)	1	
		(ATTACHING PARTS)		
-121	180122	. . CAPSCREW, Hex head (24617)	2	
		---*---		
-122	1316815	. . SEAL, Starter (74865)	1	
-123	3878973	. . COVER, Torque converter (74865)	1	
		(ATTACHING PARTS)		
-124	120706	. . CAPSCREW, Hex head (24617)	2	
-125	120380	. . WASHER, Lock (24617)	2	
		---*---		
-126	3418423	. . TUBE, Oil level indicator (74865)	1	
-127	3418421	. . INDICATOR, Oil level (74865)	1	
-128	3462094	. . BREATHER, Crankcase (74865)	1	
	4027638	. . ENGINE, Stub (74865)	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-25-129	No Number	. . . ENGINE, Head thru pan (74865)	REF	
-130	4058428	. . . DRIVE PLATE, Torque converter (74865) (See figure 6-48 for details)	REF	
-131	4058695	. . . CONVERTER, Torque (74865) (See figure 6-48 for details)	REF	
-132	3874877	. . . DISTRIBUTOR, Electronic ignition. (74865) (See figure 6-29 for breakdown)	1	
		(ATTACHING PARTS)		
-133	6023294	. . . SCREW AND WASHER (74865)	1	
		—*—		
-134	2095740	. . . GASKET, Distributor (74865).	1	
-135	48106	. . . CABLE SET, Ignition (See figure 6-5 for breakdown)	REF	
-136	RBL-13Y	. . . PLUG, Spark (11583)	6	
-137	3675848	. . . ELBOW, Water outlet (74865).	1	
		(ATTACHING PARTS)		
-138	122188	. . . CAPSCREW, Hex head (24617)	2	
-139	120233	. . . CAPSCREW, Hex head (24617)	1	
-140	120382	. . . WASHER, Lock (24617)	3	
		—*—		
-141	2125670	. . . . BEARING, SHAFT AND SEAL ASSEMBLY (74865)	1	
-142	2846080	. . . . RING, Retaining (74865)	1	
-143	3675850	. . . . HOUSING, Elbow and bearing (74865)	1	
-144	2129265	. . . . HUB, Fan pulley (74865)	1	
-145	4031068	. . . THERMOSTAT (74865)	1	
-146	1947671	. . . GASKET, Thermostat (74865)	1	
-147	2806211	. . . DAMPENER, Vibration (74865)	1	
-148	No Number	. . . MANIFOLDS GROUP (74865) (See figure 6-31 for breakdown)	REF	
-149	4106034	. . . PUMP, Water (74865) (See figure 6-28 for breakdown)	1	
-150	3671076	. . . VALVE, PCV (74865).	1	
-151	3751510	. . . GROMMET, PCV valve (74865)	1	
-152	2946079	. . . GROMMET, Crankcase breather (74865).	1	
-153	2946051	. . . CAP, Oil filler (74865)	1	
-154	3745916	. . TRANSMISSION ASSEMBLY (74865) (See figure 6-39 for breakdown)	1	
		(ATTACHING PARTS)		
-155	180153	. . CAPSCREW, Hex head (24617)	3	
-156	120383	. . WASHER, Lock (24617)	3	
-157	180134	. . CAPSCREW, Hex head (24617)	3	
-158	120382	. . WASHER, Lock (24617)	3	
		—*—		
-159	34527	. . BRAKE ASSEMBLY, Parking (See figure 6-40 for breakdown)	REF	

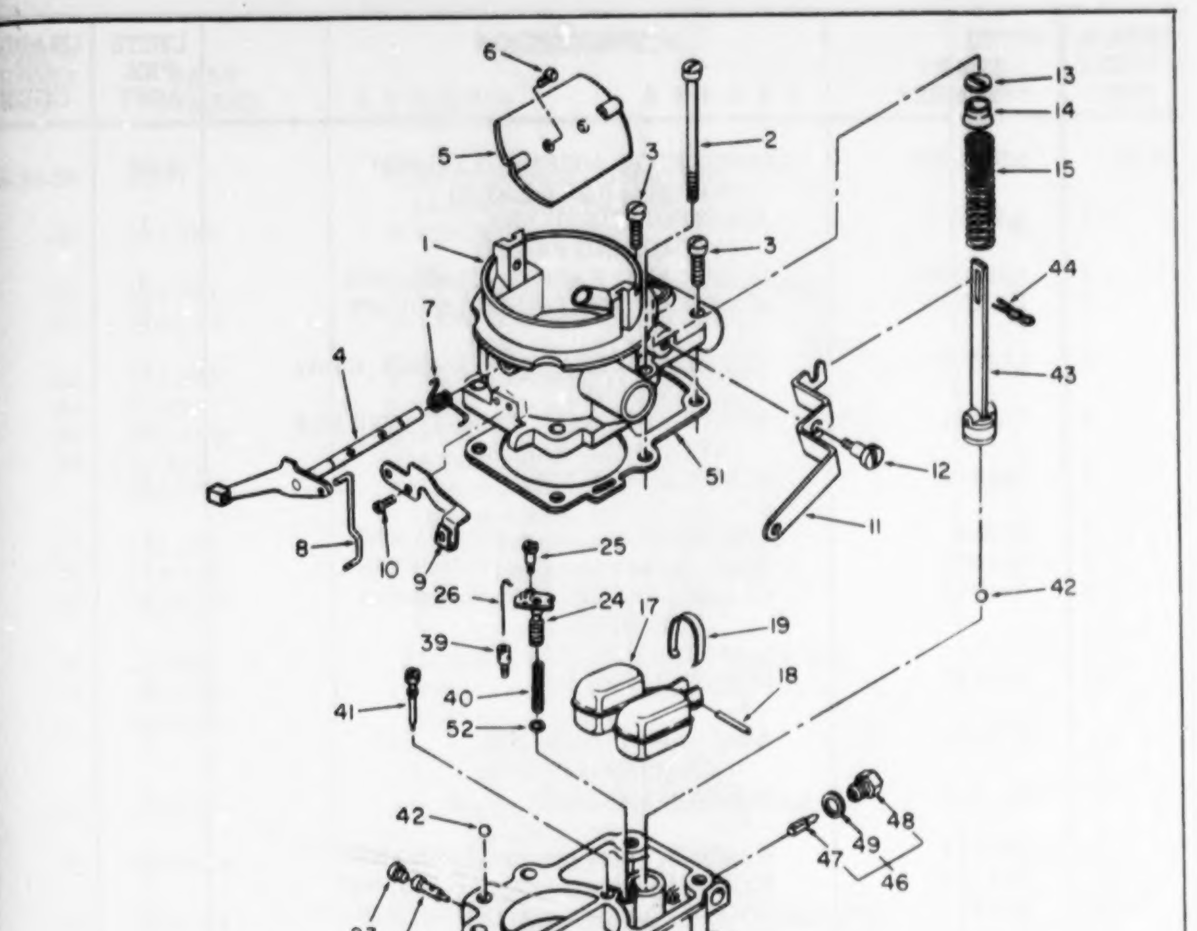
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Figure 6-26. Carburetor Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-26	BBS6220S	CARBURETOR ASSEMBLY (71500) (See figure 6-25 for NHA)	REF	
- 1	6-2073	. AIRHORN (71500) NSS	1	
		(ATTACHING PARTS)		
- 2	101-359A	. SCREW AND WASHER (71500) NSS	4	
- 3	101-307A	. SCREW AND WASHER (71500) NSS	2	
		—*—		
- 4	14-870S	. LEVER AND SHAFT ASSEMBLY, Choke (71500) NSS	1	
- 5	7-195S	. VALVE ASSEMBLY, Choke (71500) NSS	1	
		(ATTACHING PARTS)		
- 6	101-596	. SCREW (71500) NSS	2	
		—*—		
- 7	61-866	. SPRING, Choke return (71500) NSS	1	
- 8	115-370	. ROD, Choke connector (71500) NSS	1	
- 9	62-286S	. CLAMP ASSEMBLY, Choke conduit (71500) NSS	1	
		(ATTACHING PARTS)		
-10	101-537	. SCREW (71500) NSS	2	
		—*—		
-11	53A-450	. ARM, Pump (71500) NSS	1	
		(ATTACHING PARTS)		
-12	101-318	. SCREW (71500) NSS	1	
		—*—		
-13	136-218	. WASHER, Pump plunger (71500) NSS	1	
-14	38A-117	. BUSHING, Pump plunger (71500) NSS	1	
-15	61-761	. SPRING, Pump plunger (71500) NSS	1	
-16	0-1995	. BODY, Main (71500) NSS	1	
-17	21-222S	. FLOAT ASSEMBLY (71500)	1	
-18	24-23	. PIN, Float (71500) NSS	1	
-19	63-169	. RETAINER, Float pin (71500) NSS	1	
-20	181-307	. CAM, Fast idle (71500) NSS	1	
		(ATTACHING PARTS)		
-21	101-473	. SCREW (71500) NSS	1	
		—*—		
-22	48-194	. JET, Pump (71500) NSS	1	
-23	11B-108	. PLUG, Pump jet (71500) NSS	1	
-24	160-302S	. PISTON AND PLATE ASSEMBLY, Step-up (71500) NSS	1	
		(ATTACHING PARTS)		
-25	101-374	. SCREW (71500) NSS	1	
		—*—		
-26	3549535	. ROD, Step-up (74865) (71500 No. 75-1897)	1	
-27	1-2132	. FLANGE ASSEMBLY (71500) NSS	1	
-28	3-1703S	. SHAFT AND LEVER ASSEMBLY, Throttle (71500) NSS	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-26-29	2-307	. PLATE, Throttle (71500) NSS	1	
		(ATTACHING PARTS)		
-30	101-633	. SCREW (71500) NSS	2	
		—*—		
-31	115-347	. ROD, Throttle connector (71500) NSS	1	
-32	3481210	. SCREW, Fast idle speed (74865) (71500 No. 101-490)	1	
-33	101-296	. SCREW, Idle speed (71500) NSS	1	
-34	61-58	. SPRING, Idle screw (71500) NSS	2	
-35	30A-197	. SCREW, Idle mixture	1	
-36	61-873	. SPRING, Idle mixture screw	1	
	3683903	. KIT, Major overhaul (74865) (includes items 37 thru 54)	AR	
-37	145-285	. . TUBE, Main vent (71500) NSS	1	
-38	11B-103	. . PLUG, Main vent (71500) NSS	1	
-39	3549539	. . JET, Main metering (74865) (71500 No. 120-448S)	1	
-40	61-538	. . SPRING, Step up piston (71500) NSS	1	
-41	123-74S	. . JET, Low speed (71500) NSS	1	
	3621401	. . KIT, Zip (74865) (includes items 42 thru 50) (71500 No. 902-277A)	AR	
-42	116-13	. . . BALL, Intake and discharge check (71500) NSS	2	
-43	2196214	. . . PLUNGER, Pump (74865) (71500 No. 64-2265) NSS	1	
-44	150A-22	. . . PIN, Pump plunger spring (71500) NSS	1	
-45	150A-10	. . . PIN, Throttle rod spring (71500) NSS	1	
-46	2809395	. . . NEEDLE AND SEAT ASSEMBLY (74865). (71500 No. 25-1020S) NSS	1	
-47	17-237A	. . . . NEEDLE (71500) NSS	REF	
-48	25-1019	. . . . SEAT (71500) NSS	REF	
-49	20-203	. . . . GASKET (71500) NSS	REF	
-50	3685661	. . . CAP, Limiter (74865) (71500 No. 96-40) NSS	1	
	3514475	. . KIT, Gasket (74865) (includes items 51 thru 54)	AR	
-51	121-697	. . . GASKET, Airhorn (71500) NSS	1	
-52	20-146	. . . GASKET, Step up piston (71500) NSS	1	
-53	121-656	. . . GASKET, Main body (71500) NSS	1	
-54	1A-157	. . . GASKET, Carburetor to governor (71500) NSS	1	

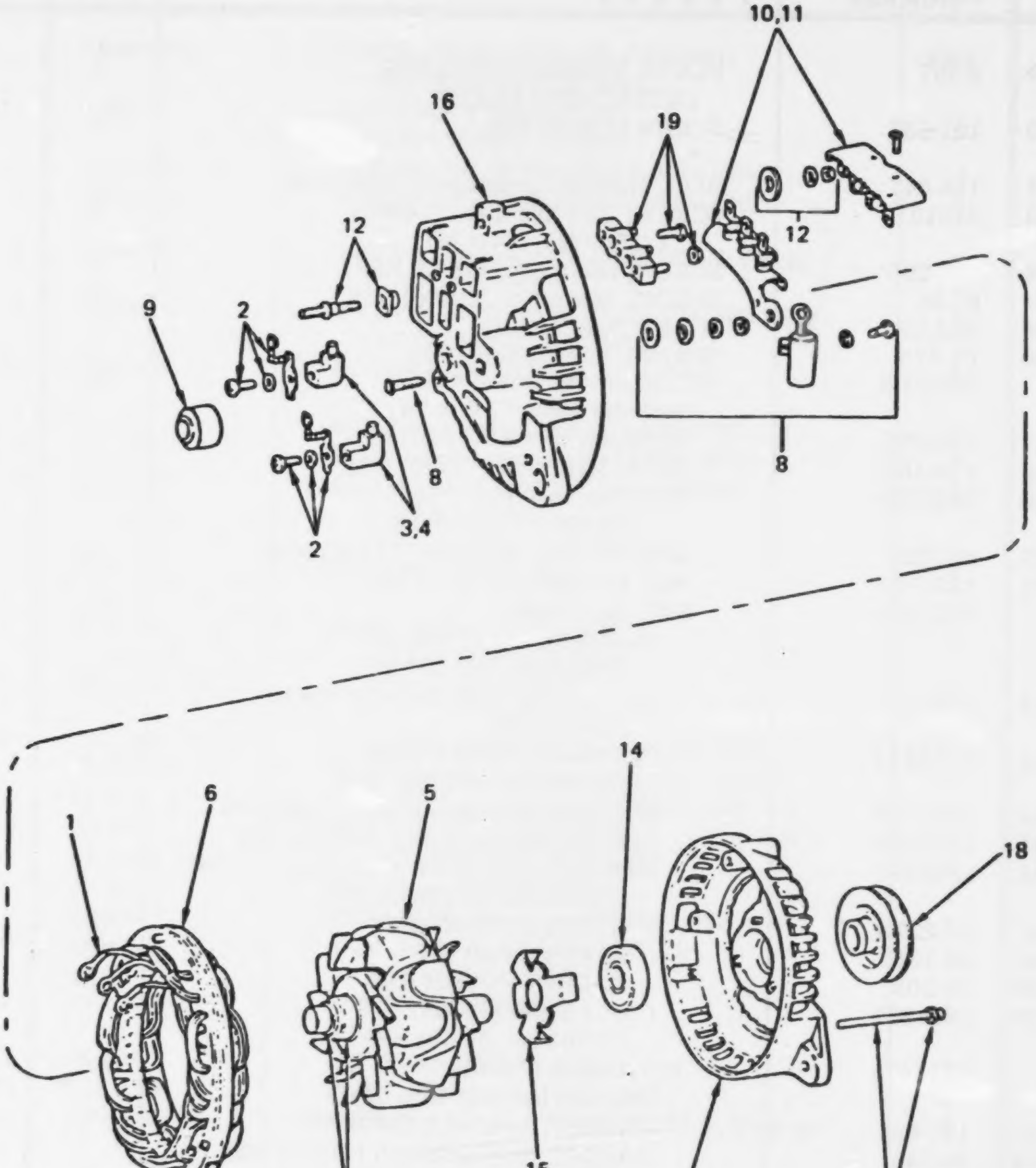
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Figure 6-27. Alternator (Chrysler)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-27	4091565	ALTERNATOR ASSEMBLY . . . . (See figure 6-25 for NHA) (74865)	REF	
- 1	3438709	. TERMINAL, Rotor (74865)	3	
- 2	4094027	. PACKAGE, Brush, washer and terminal (74865) .	1	
- 3	4091667	. BRUSH HOLDER, Axial (74865)	1	
- 4	3438159	. BRUSH HOLDER, Radial (74865)	1	
- 5	4091518	. ROTOR (74865)	1	
- 6	4091514	. STATOR (74865)	1	
- 7	3744889	. PACKAGE, Slip ring and retainer (74865) . . .	1	
- 8	3620793	. PACKAGE, Capacitor and insulator (74865) . .	1	
- 9	3755184	. BEARING, Rectifier end shield (74865)	1	
-10	4026082	. HEAT SINK, Rectifier positive (74865)	1	
-11	3438721	. HEAT SINK, Rectifier negative (74865)	1	
-12	4057929	. TERMINAL, Battery positive (74865)	1	
-13	4091534	. SHIELD, Drive end (74865)	1	
-14	2098498	. BEARING, Drive end shield (74865)	1	
-15	4091398	. PLATE, Drive end bearing retainer (74865) . .	1	
-16	4091516	. SHIELD, Rectifier end (74865)	1	
-17	4091505	. SCREW AND WASHER, Frame (74865) . . .	3	
-18	2444478	. PULLEY (74865)	1	
-19	3438729	. INSULATOR, Stator terminal stud (74865) . .	1	

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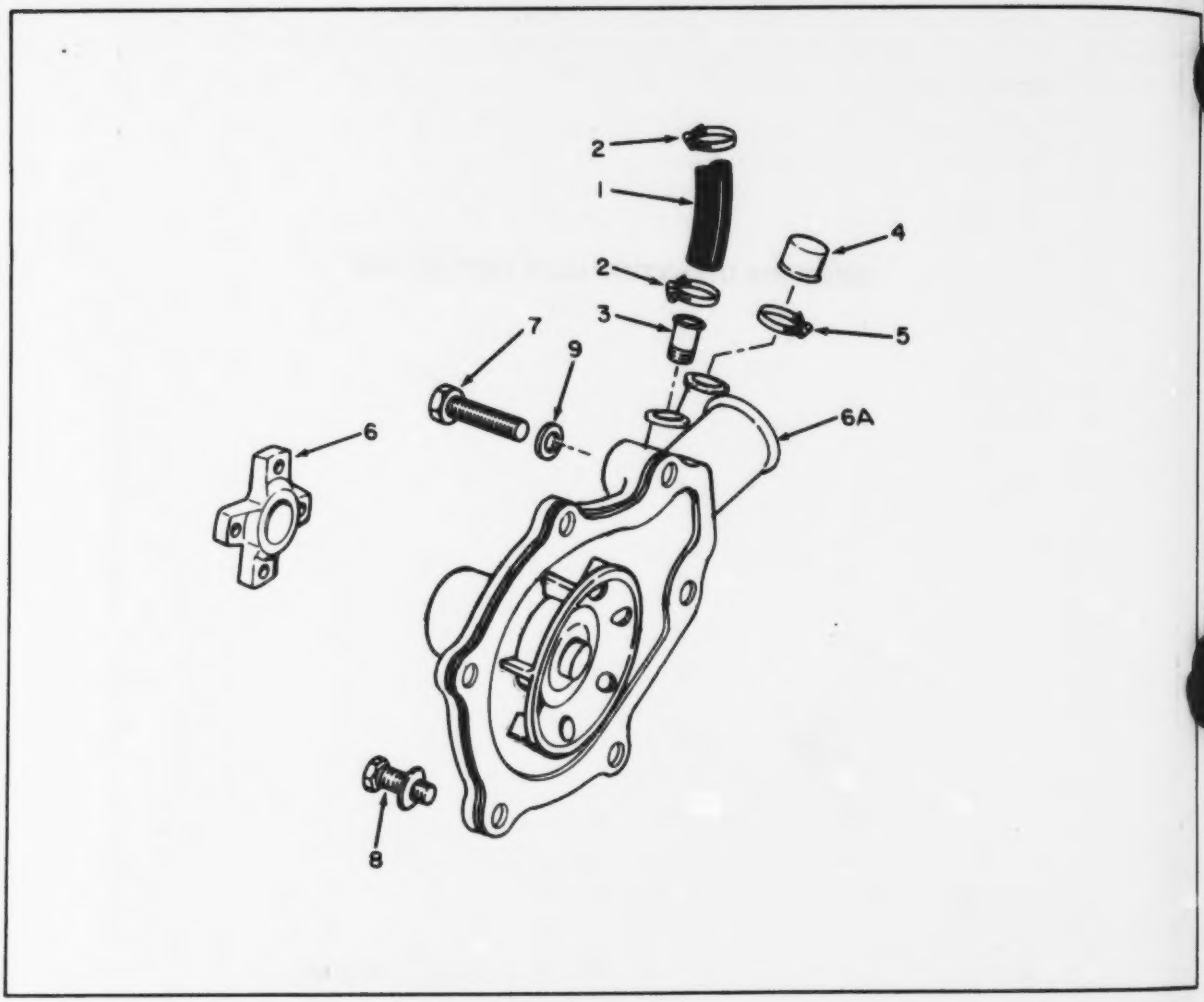
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Figure 6-28. Water Pump Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-28-	No Number	INSTALLATION, Water pump	REF	
- 1	1315466	. HOSE, Bypass (50 ft length) (74865)	1	
		(ATTACHING PARTS)		
- 2	111606	. CLAMP, Hose (74865)	2	
		---*---		
- 3	1947643	. NIPPLE, Bypass hose (74865)	1	
- 4	2128425	. CAP, Heater outlet (74865)	1	
		(ATTACHING PARTS)		
- 5	111606	. CLAMP, Hose (74865)	1	
		---*---		
- 6	2129265	. HUB, Fan and pulley (74865)	1	
-6A	2808679	. PUMP, Water (74865)	1	
		(ATTACHING PARTS)		
- 7	122168	. CAPSCREW, Hex head (24617)	2	
- 8	122145	. CAPSCREW, Hex head (24617)	4	
- 9	120382	. WASHER, Lock (24617)	6	
		---*---		
6-29-	3874877	DISTRIBUTOR ASSEMBLY (74865)	REF	
		(See figure 6-25 for NHA)		
- 1	2642986	. CAP, Distributor (74865)	1	
- 2	2979781	. ROTOR (74865)	1	
- 3	3656862	. RELUCTOR (74865)	1	
- 4	3656866	. PICKUP AND PLATE ASSEMBLY (74865) . .	1	
		(ATTACHING PARTS)		
- 5	6026736	. SCREW (74865)	1	
		---*---		
- 6	9417599	. PIN, Small (74865)	1	
- 7	9414521	. PIN, Large (74865)	1	
- 8	1879607	. PIN, Snap (74865)	1	
- 9	3874797	. SHAFT, Drive (74865)	1	
-10	2095630	. SEAL, Oil (74865)	1	
-11	3874878	. CONTROL, Vacuum (74865)	1	
-12	3656863	. HOUSING, Distributor (74865)	1	
-13	1838508	. SPRING, Cap holddown (74865)	2	
-14	2084653	. GEAR AND PIN PACKAGE, Drive shaft (74865)	1	

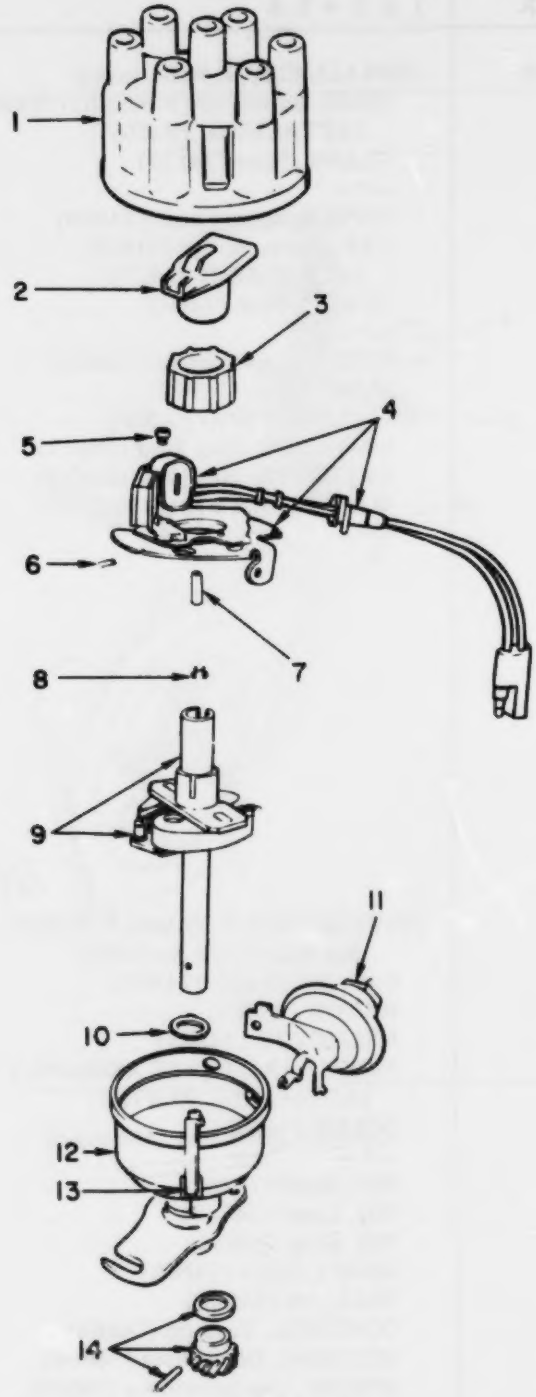
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Figure 6-29. Ignition Distributor Assembly

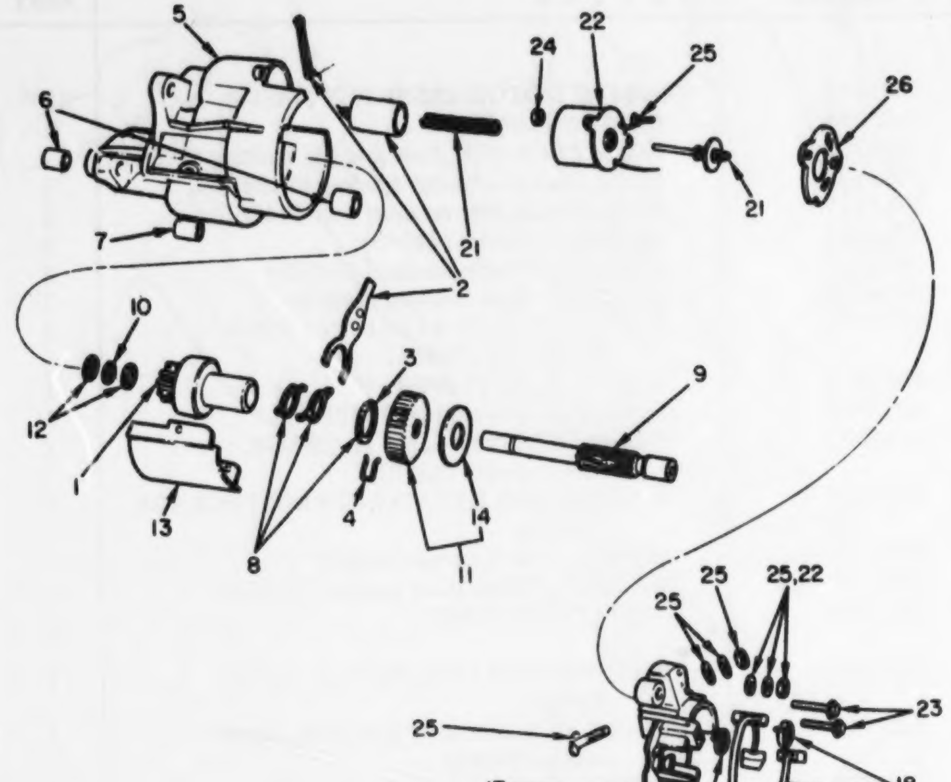

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Figure 6-30. Starter Motor Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-30-				
	4091975	STARTER MOTOR ASSEMBLY (74865)	REF	
- 1	4106093	. CLUTCH (74865)	1	
- 2	3620733	. FORK PACKAGE, Core and pin shifting (74865)	1	
- 3	2095130	. RING, Clutch actuator retainer (74865)	1	
- 4	2095117	. RING, Pinion gear retainer snap (74865)	1	
- 5	3755261	. HOUSING, Pinion (74865)	1	
- 6	3656382	. BEARING, Pinion housing (74865)	2	
- 7	3656383	. BEARING, Gear housing (74865)	1	
- 8	2275556	. ACTUATOR AND RETAINING RING PACKAGE (74865)	1	
- 9	4091914	. SHAFT, Pinion (74865)	1	
-10	6022006	. RING, Pinion retaining (74865)	1	
-11	4106091	. GEAR AND SNAP RING PACKAGE, Pinion shaft (74865)	1	
-12	2275558	. WASHER AND RETAINING RING PACKAGE (74865)	1	
-13	2095116	. COVER, Gear housing (74865)	1	
-14	2095114	. WASHER, Pinion shaft friction (74865)	1	
-15	3837325	. ARMATURE (74865)	1	
-16	3837340	. WASHER PACKAGE, Armature thrust (74865)	1	
-17	3838097	. PLATE AND BRUSH PACKAGE, Brush holder (74865)	1	
-18	2084666	SPRING PACKAGE, Brush (74865)	4	
-19	3656558	. FRAME W/FIELD (74865)	1	
-20	3656540	. SCREW, Frame (74865)	2	
-21	2932814	. CONTACT AND SPRING PACKAGE, Solenoid (74865)	1	
-22	3837337	. SOLENOID PACKAGE (74865)	1	
-23	6027772	. SCREW AND WASHER, Solenoid to plate (74865)	2	
-24	6023202	. NUT AND WASHER, Solenoid to housing (74865)	2	
-25	3579193	. STUD AND WASHER PACKAGE, Solenoid (74865)	1	
-26	2875558	. SEAL, Solenoid contact (74865)	1	
-27	2095076	. HEAD ASSEMBLY, End (74865)	1	

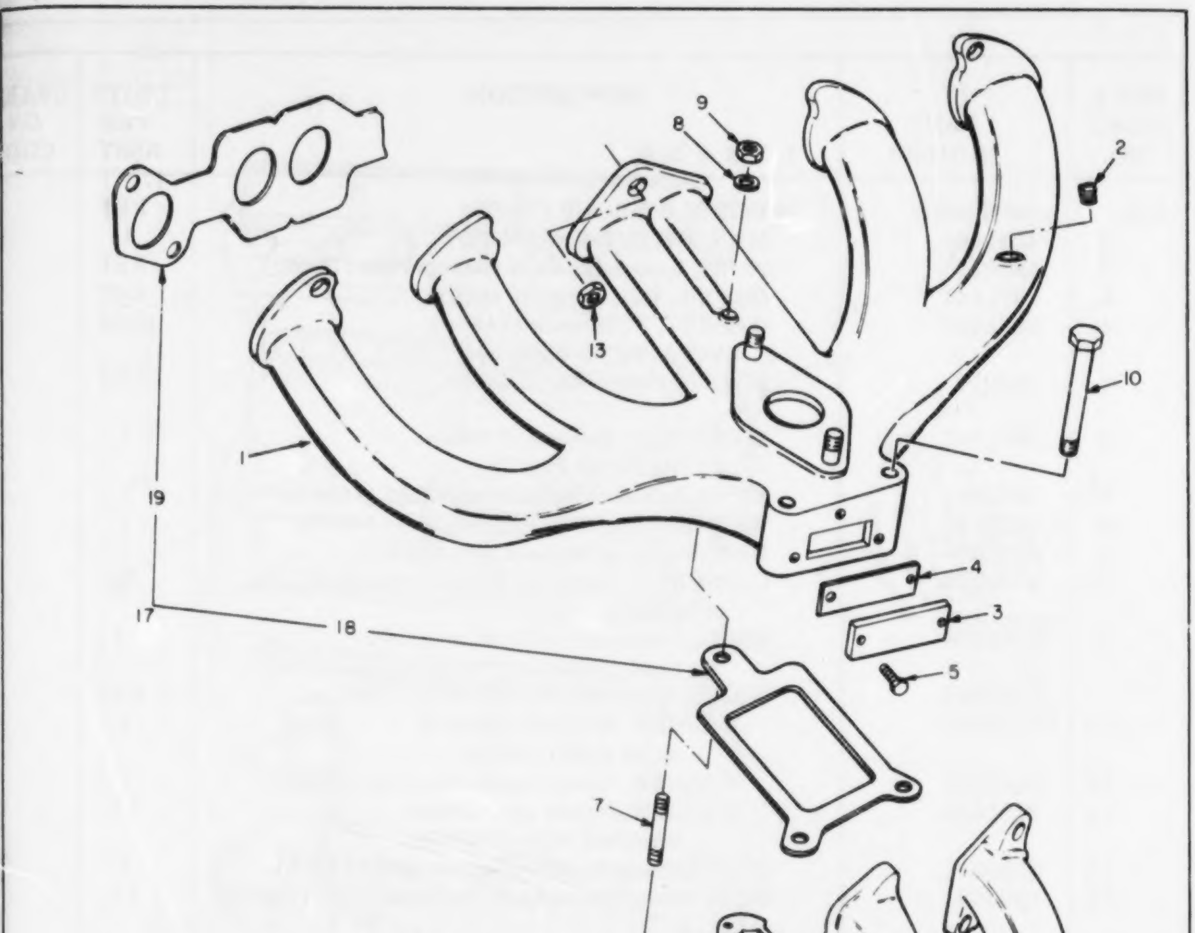
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Figure 6-31. Manifold Group

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABL ON CODE
6-31-	No Number	MANIFOLD GROUP (74865)	REF	
-1	4041461	. MANIFOLD, Intake (74865)	1	
-2	1859127	. PLUG, Intake manifold vacuum hole (74865)	REF	
-3	3671447	. COVER, EGR flange (74865)	REF	
-4	3671425	. GASKET, EGR cover (74865)	REF	
		(ATTACHING PARTS)		
-5	180078	. SCREW, EGR cover (74865)	REF	
		---*---		
-6	3671860	. MANIFOLD, Exhaust (74865)	1	
		(ATTACHING PARTS)		
-7	152568	. STUD, Intake to exhaust manifold (74865)	1	
-8	6022185	. WASHER, Intake to exhaust stud (74865)	1	
-9	6025020	. NUT, Intake to exhaust stud (74865)	1	
-10	6030008	. CAPSCREW, Intake to exhaust manifold (74865)	2	
-11	6030209	. STUD, Intake and exhaust manifold to head (74865)	13	
	3744826	. WASHER PACKAGE, Manifold (74865)	REF	
-12	3751637	. . WASHER, Exhaust manifold upper ends (74865)	2	
-13	2121223	. . WASHER, Intake manifold center (74865)	1	
-14	3751636	. . WASHER, Intake and exhaust manifold studs (74865)	10	
-15	6030210	. NUT, Exhaust manifold upper ends (74865)	2	
-16	120368	. NUT, Intake and exhaust manifold studs (74865)	11	
		---*---		
-17	4094877	. GASKET PACKAGE, Intake and exhaust manifold (74865)	REF	
-18	3614387	. . GASKET, Intake to exhaust manifold (74865)	1	
-19	1947762	. . GASKET, Manifolds to head (74865)	1	
-20	3420047	. CONTROL PACKAGE, Exhaust manifold heat (74865)	1	
-21	1639597	. PIN, Heat control valve spring (74865)	1	
-22	3462514	. SPRING, Heat control valve (74865)	1	
-23	2947107	. STOP, Heat control valve (74865)	1	

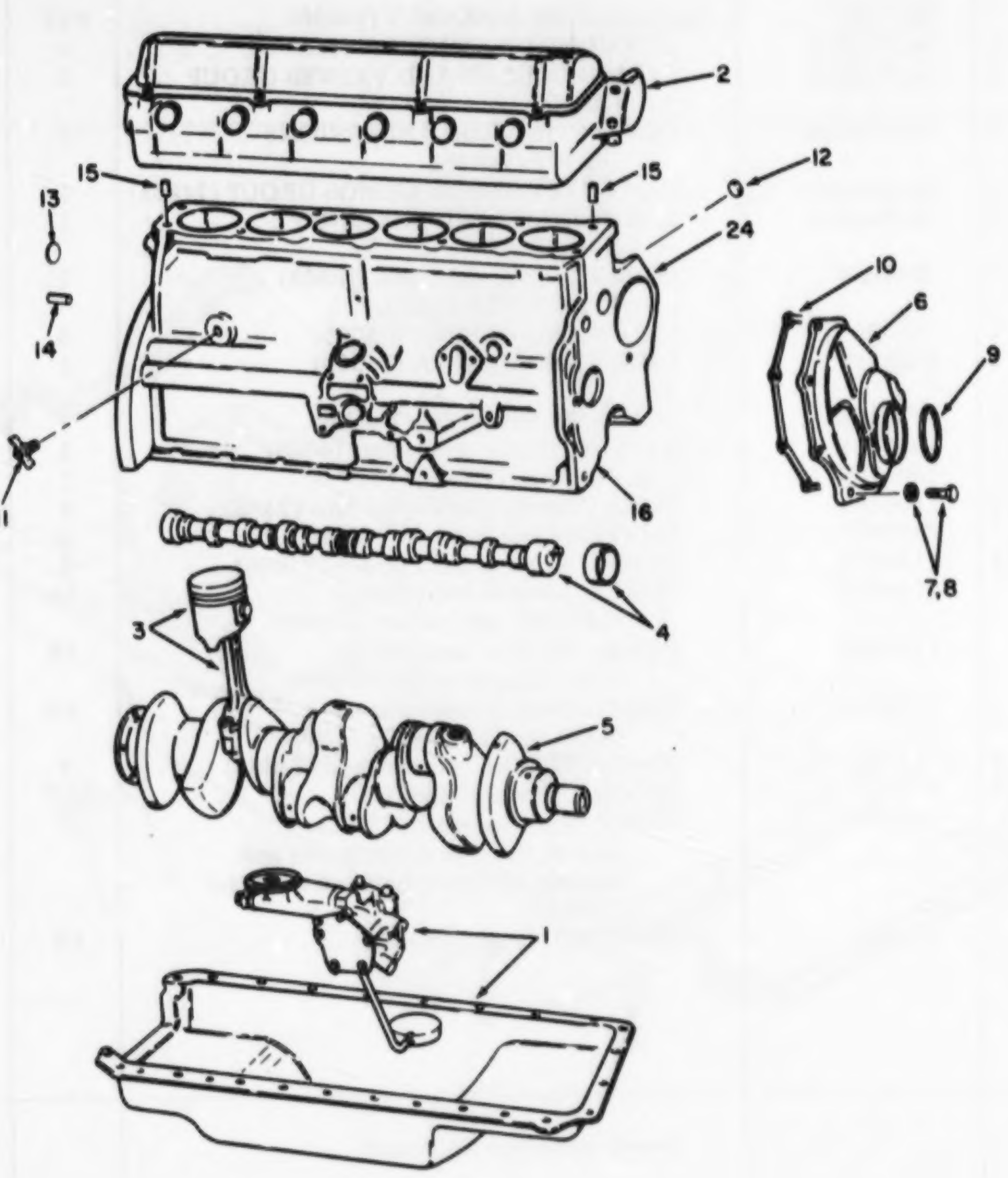
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Figure 6-32. Basic Engine Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-32-	4027638	BASE ENGINE ASSEMBLY (74865)	REF	
- 1	No Number	. LUBRICATION SYSTEM (74865)	1	
- 2	No Number	. CYLINDER HEAD AND VALVES GROUP (74865)	1	
- 3	No Number	. CONNECTING ROD AND PISTONS GROUP (74865)	1	
- 4	No Number	. CAM SHAFT AND BEARINGS GROUP (74865)	1	
- 5	No Number	. CRANKSHAFT AND BEARINGS GROUP (74865)	1	
- 6	3769960	. COVER, Timing chain case (74865)	1	
		(ATTACHING PARTS)		
- 7	181086	. SCREW AND WASHER (74865)	6	
- 8	6024246	. SCREW AND WASHER (74865)	1	
		—*—		
- 9	3830108	. SEAL ASSEMBLY, Oil (74865)	1	
-10	1947554	. GASKET, Timing chain case (74865)	1	
-11	1686198	. VALVE, Drain (74865)	1	
-12	2406356	. PLUG, Cylinder block water hole (74865)	5	
-13	2402905	. PLUG, Cam rear bearing (74865)	1	
-14	1122532	. DOWEL, Block to transmission (74865)	2	
	1736347	. DOWEL, Block to transmission (0.007 in. over center) (74865)	AR	
	1736348	. DOWEL, Block to transmission (0.014 in.over center) (74865)	AR	
	1736353	. DOWEL, Block to transmission (0.021 in.over center) (74865)	AR	
-15	141195	. DOWEL, Block to cylinder head (74865)	2	
-16	N.S.S.	. BLOCK, Cylinder (74865)	REF	
	3462605	. BLOCK, Short (consists of block, pistons, rings, connecting rods and bearings and crankshaft and bearings) (74865)	1	
	48440	GASKET SET, Engine Overhaul	AR	

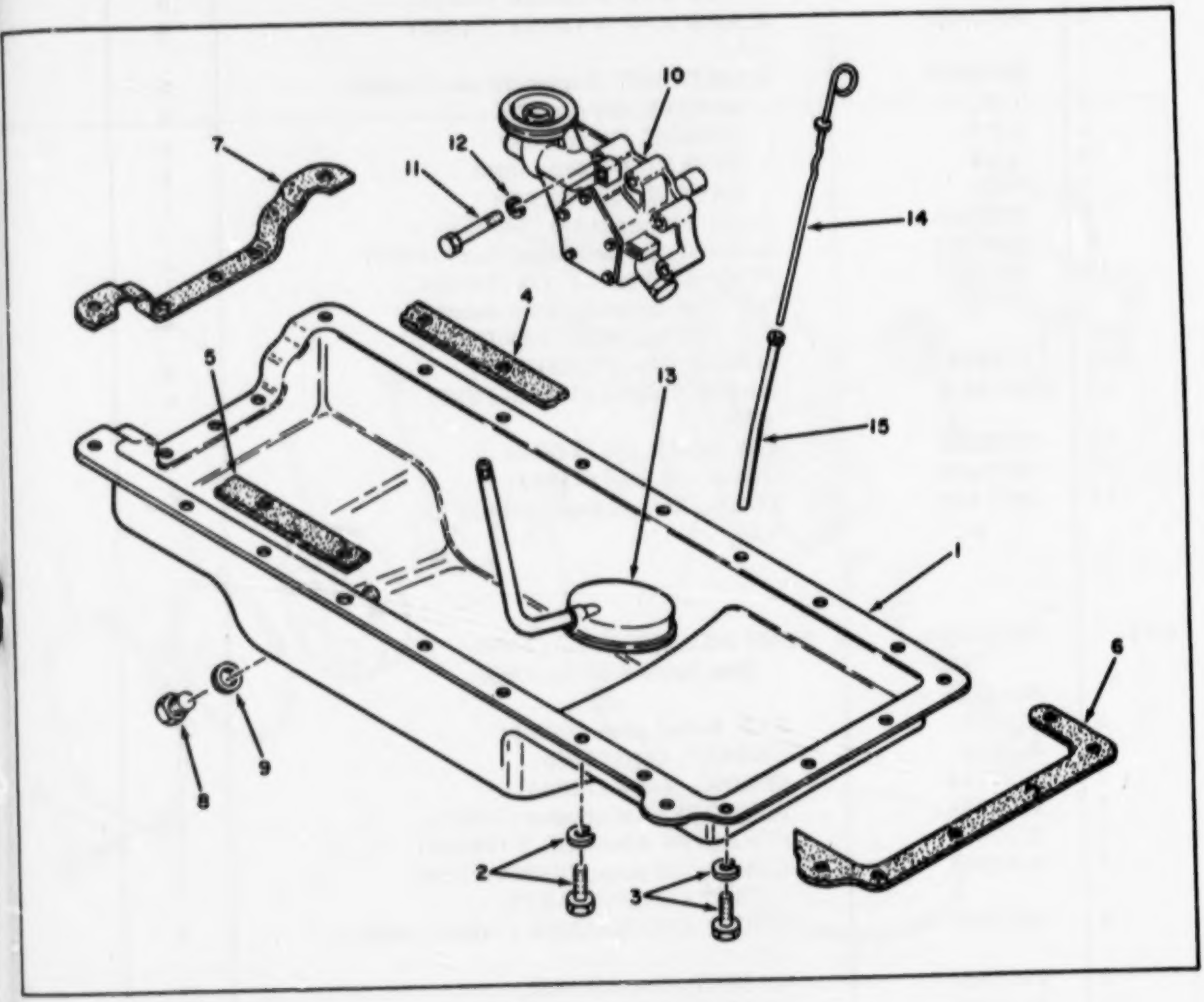
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Figure 6-33. Lubrication System

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-33-	No Number	LUBRICATION SYSTEM (74865)	REF	
- 1	3614264	. PAN, Engine oil (74865)	1	
		(ATTACHING PARTS)		
- 2	6022271	. SCREW AND WASHER (74865)	18	
- 3	6022230	. SCREW AND WASHER (74865)	6	
		---*---		
	2240647	. GASKET SET, Engine oil pan (74865)	1	
- 4	N.S.S.	. . GASKET, Oil pan, RH	1	
- 5	N.S.S.	. . GASKET, Oil pan, LH	1	
- 6	N.S.S.	. . GASKET, Oil pan, front	1	
- 7	N.S.S.	. . GASKET, Oil pan, rear	1	
- 8	2600089	. PLUG, Oil pan drain (74865)	1	
- 9	2268513	. GASKET, Oil pan drain plug (74865)	1	
-10	2808507	. PUMP ASSEMBLY, Oil (74865)	1	
		(See figure 6-34 for details)		
		(ATTACHING PARTS)		
-11	179823	. SCREW, Cap (74865)(NSS)	6	
-12	9414321	. WASHER, Lock (74865) (NSS)	6	
		---*---		
-13	2780999	. STRAINER, Oil (74865)	1	
-14	3671484	. GAGE, Oil level (74865)	1	
-15	3671483	. TUBE, Oil level gage (74865)	1	
6-34-	2808507	PUMP ASSEMBLY, Oil (74865)	REF	
		(See figure 6-33 for NHA)		
- 1	Not Used			
- 2	618621	. CAP, Relief valve (74865)	1	
- 3	618622	. GASKET, Cap (74865)	1	
- 4	1737742	. SPRING, Relief (74865)	1	
- 5	2120764	. PLUNGER, Relief valve (74865)	1	
- 6	2780999	. STRAINER ASSEMBLY (74865)	1	
- 7	2463986	. COVER, Oil pump (74865) (NSS)	1	
		(ATTACHING PARTS)		
- 8	6022205	. SCREW AND WASHER (74865) (NSS)	5	
		---*---		
- 9	2268921	. GASKET, Cover (74865)	1	
-10	1947225	. GEAR, Oil pump drive (74865)	1	
	2084415	. ROTOR AND SHAFT PACKAGE (74865)	1	
-11	N.S.S.	. . ROTOR, Outer	1	
-12	N.S.S.	. . ROTOR, Inner	1	
-13	N.S.S.	. . SHAFT, Oil pump drive	1	
-14	N.S.S.	. BODY, Oil pump	1	
-15	2121404	. GASKET, Body (74865)	1	

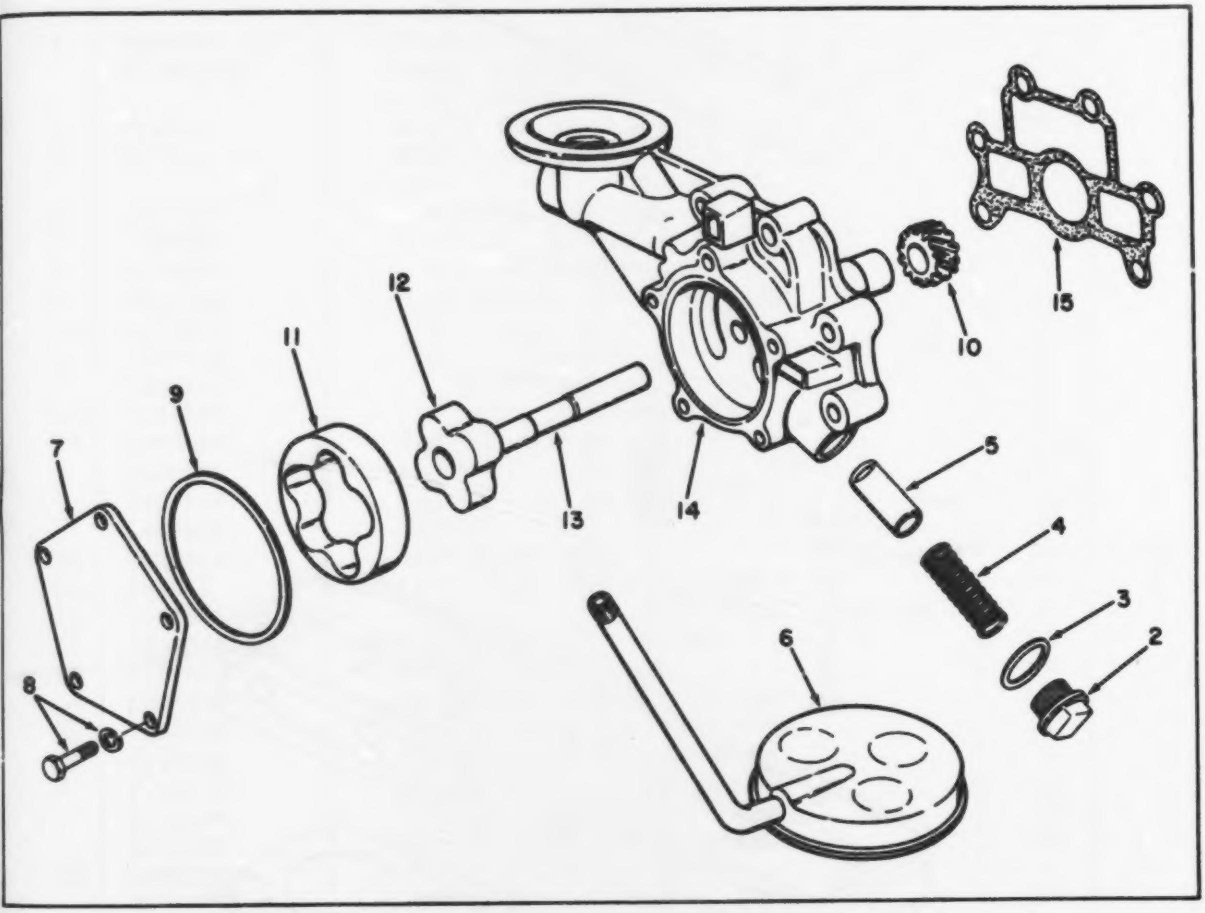
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Figure 6-34. Oil Pump Assembly

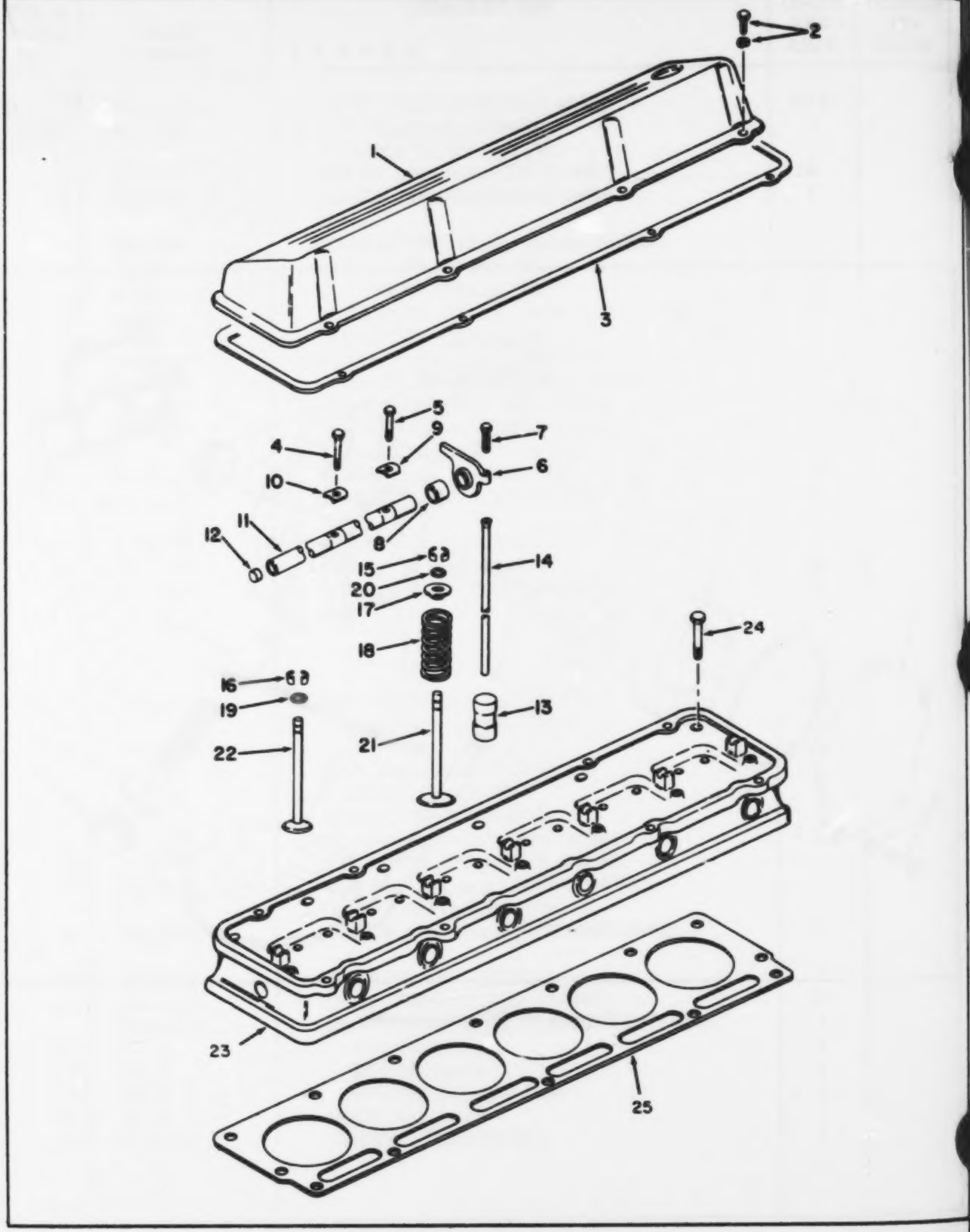
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Figure 6-35. Cylinder Head and Valves Group

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-35-	No Number	CYLINDER HEAD AND VALVES GROUP (74865) (See figure 6-32 for NHA)	REF	
-1	4071077	. COVER ASSEMBLY, Cylinder head (74865)	1	
		(ATTACHING PARTS)		
-2	6022202	. SCREW AND WASHER (74865)	8	
		—*—		
-3	2899250	. GASKET, Cover (74865)	1	
	No Number	. SHAFT ASSEMBLY, Valve rocker arm (74865)	1	
		(ATTACHING PARTS)		
-4	179846	. SCREW, Cap, hex (74865)	6	
-5	3870322	. SCREW, Cap, hex (74865)	1	
		—*—		
-6	1947594	. . ROCKER, Valve (74865)	12	
-7	1855238	. . SCREW, Adjustment (74865)	12	
-8	2120694	. . SPACER, Rocker arm (74865)	6	
-9	1947616	. . RETAINER, End and intermediate (74865)	6	
-10	1947617	. . RETAINER, Center (74865)	1	
-11	1947614	. . SHAFT ASSEMBLY (74865)	1	
	1946515	. . . SHAFT (74865)	1	
-12	1324268	. . . PLUG, End (74865)	2	
-13	2469501	. TAPPET, Valve, std (74865)	12	
	2469502	. TAPPET, Valve, 0.001 in. o/s (74865)	AR	
	2469503	. TAPPET, Valve, 0.008 in. o/s (74865)	AR	
	2469504	. TAPPET, Valve, 0.030 in. o/s (74865)	AR	
-14	2120514	. ROD, Push (74865)	12	
-15	381875	. LOCK, Valve stem, intake (74865)	12	
-16	1614666	. LOCK, Valve stem, exhaust (74865)	12	
-17	2402045	. RETAINER, Spring (74865)	12	
-18	1739534	. SPRING, Valve (74865)	12	
-19	2205958	. SEAL, Stem, intake valve (74865)	6	
-20	2205959	. SEAL, Stem, exhaust valve (74865)	6	
-21	1947623	. VALVE, Intake, std (74865)	6	
	2121578	. VALVE, Intake, 0.005 o/s (74865)	AR	
	2121579	. VALVE, Intake, 0.015 o/s (74865)	AR	
	2121580	. VALVE, Intake, 0.030 o/s (74865)	AR	
-22	3698590	. VALVE, Exhaust, std (74865)	6	
	3698591	. VALVE, Exhaust, 0.005 o/s (74865)	AR	
	3698592	. VALVE, Exhaust, 0.015 o/s (74865)	AR	
	3698593	. VALVE, Exhaust, 0.030 o/s (74865)	AR	
-23	3698448	. HEAD, Cylinder (74865)	1	
		(ATTACHING PARTS)		
-24	1947687	. SCREW, Cap, hex (74865)	14	
		—*—		
-25	2843182	. GASKET, Cylinder head (74865)	1	
-26	3751249	. COVER, Air injection (74865) (not illustrated)	1	
-27	3671142	. GASKET, Cover (74865) (not illustrated)	1	

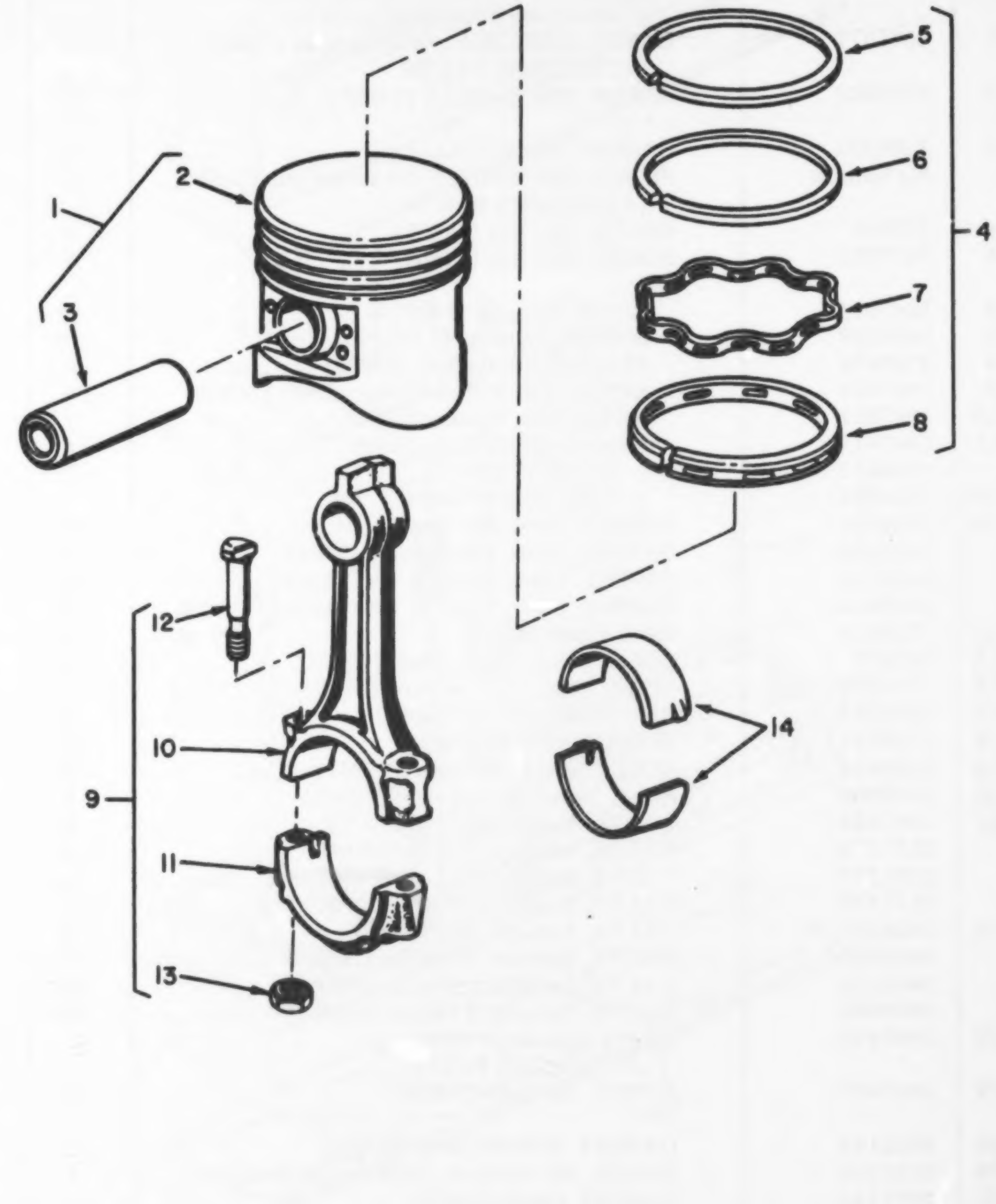
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Figure 6-38. Connecting Rod and Piston Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-36-	No Number	CONNECTING ROD AND PISTON ASSEMBLY . (74865)	REF	
-1	2084384	. PISTON AND PIN ASSEMBLY, Std (74865) . .	6	
	2084385	. PISTON AND PIN ASSEMBLY, 0.005 in. o/s . . (74865)	AR	
	2084386	: PISTON AND PIN ASSEMBLY, 0.020 in. o/s . . (74865)	AR	
	2084387	. PISTON AND PIN ASSEMBLY, 0.040 in. o/s . . (74865)	AR	
-2	N.S.S.	. . PISTON (74865)	REF	
-3	N.S.S.	. . PIN, Piston (74865)	REF	
	2448735	. RING SET, Piston complete, std-0.009 in. o/s . . (74865)	1	
-4	3780001	. . RING SET, Piston, single cylinder, std . . . . 0.009 in. o/s (74865) (NSS)	6	
-5	N.S.S.	. . . RING, Upper compression (74865)	REF	
-6	N.S.S.	. . . RING, Lower compression (74865)	REF	
-7	N.S.S.	. . . RAIL, Oil control ring (74865)	REF	
-8	N.S.S.	. . . SPACER, Oil control ring (74865)	REF	
	2275440	. RING SET, Piston, complete, 0.020-0.029 . . . in. o/s (74865)	AR	
	3780002	. . RING SET, Piston, single cylinder, ... 0.020-0.029 in. o/s (74865)	AR	
	2275441	. RING SET, Piston, complete, 0.040-0.049 . . . in. o/s (74865)	AR	
	3780003	. . RING SET, Piston, single cylinder, ... 0.040-0.049 in. o/s (74865)	AR	
-9	4041994	. ROD ASSEMBLY, Connecting (74865)	6	
-10	N.S.S.	. . ROD, Connecting (74865)	REF	
-11	N.S.S.	. . CAP, Connecting rod (74865)	REF	
-12	3830614	. . BOLT, Connecting rod cap (74865)	2	
-13	1737695	. . NUT, Connecting rod cap bolt (74865) . . .	2	
-14	4049256	. BEARING PACKAGE, Connecting rod, ... std (74865)	6	
	4049257	. BEARING PACKAGE, Connecting rod, ... 0.001 in. u/s (74865)	AR	
	4049258	. BEARING PACKAGE, Connecting rod, ... 0.002 in u/s (74865)	AR	
	4049259	. BEARING PACKAGE, Connecting rod, ... 0.003 in. u/s (74865)	AR	
	4049260	. BEARING PACKAGE, Connecting rod, ... 0.010 in u/s (74865)	AR	
	4049261	. BEARING PACKAGE, Connecting rod, ... 0.012 in. u/s (74865)	AR	

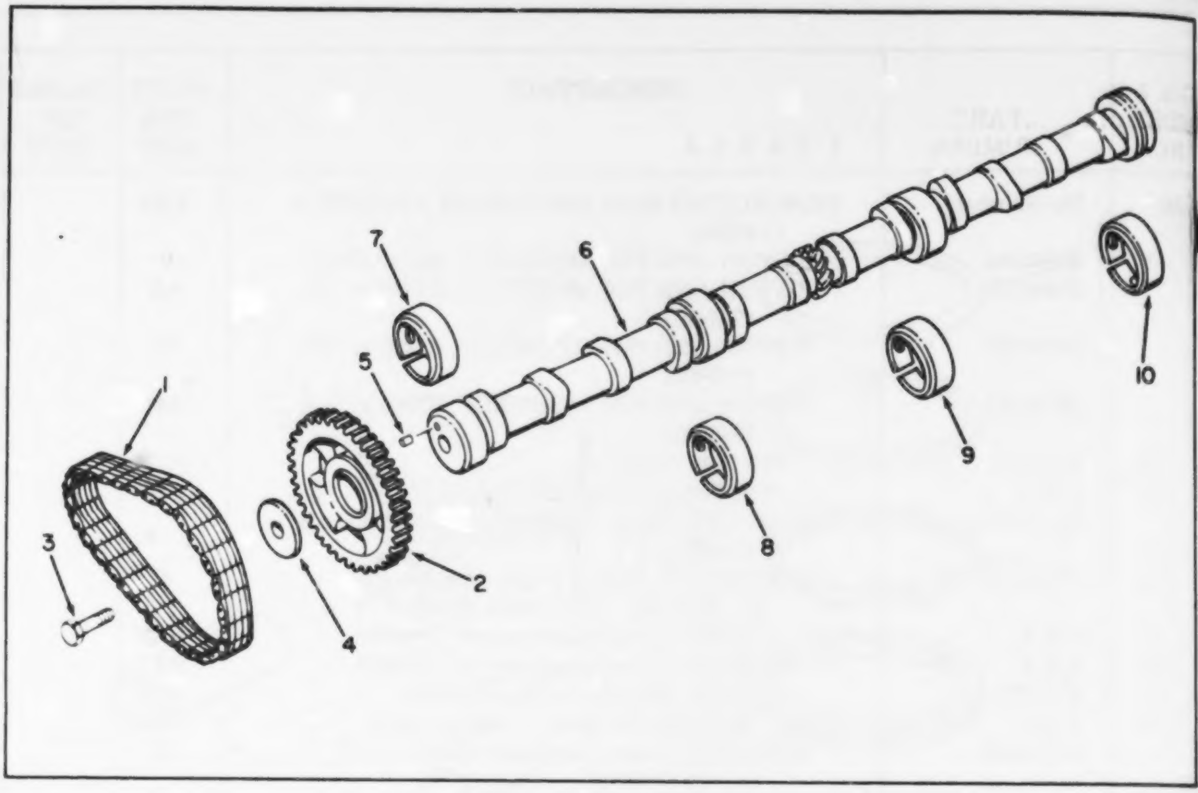

Figure 6-37. Camshaft and Bearings Group

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-37-	No Number	CAMSHAFT AND BEARINGS GROUP (74865) . (See figure 6-32 for NHA)	REF	
- 1	3514866	. CHAIN, Timing (74865)	1	
- 2	2806945	. SPROCKET, Camshaft (74865)	1	
		(ATTACHING PARTS)		
- 3	180147	. SCREW, Cap (74865)	1	
- 4	6023053	. WASHER, Flat (74865)	1	
- 5	141195	. PIN, Straight (74865)	1	
		---*---		
- 6	3512639	. CAMSHAFT (74865)	1	
- 7	3830601	. BEARING, Sleeve, No. 1, std (74865)	1	
	3830602	. BEARING, Sleeve, No. 1, 0.010 in. o/s . . . . (74865)	AR	
- 8	1821772	. BEARING, Sleeve, No. 2, std (74865)	1	
	2205512	. BEARING, Sleeve, No. 2, 0.010 in. o/s . . . . (74865)	AR	
- 9	2121726	. BEARING, Sleeve, No. 3 std (74865)	1	
	2205514	. BEARING, Sleeve, No. 3, 0.010 in. o/s . . . . (74865)	AR	
-10	2121727	. BEARING, Sleeve, No. 4 std (74865)	1	
	2205516	. BEARING, Sleeve, No. 4, 0.010 in. o/s . . . . (74865)	AR	

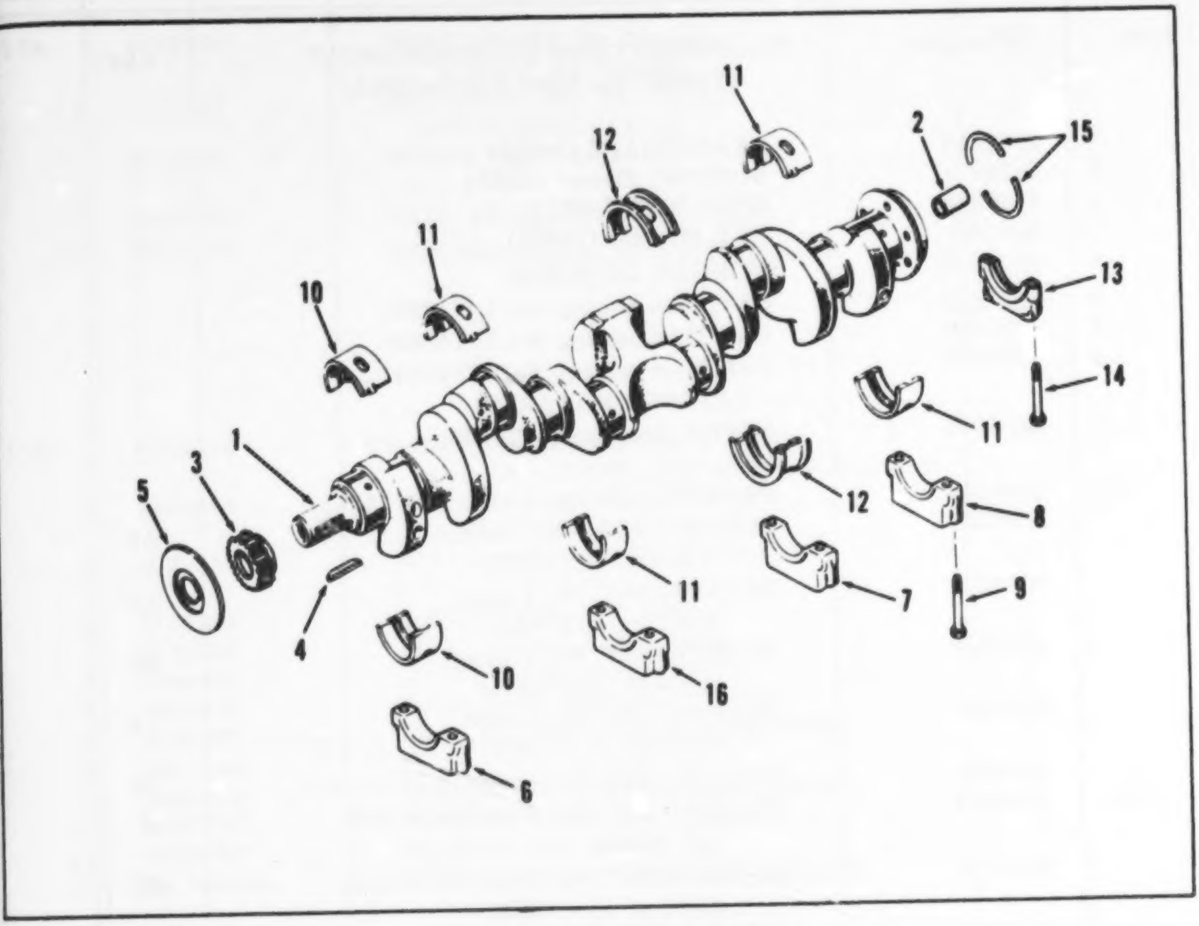
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Figure 6-38. Crankshaft and Bearings Group

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABL ON CODE
6-38-	No Number	CRANKSHAFT AND BEARINGS GROUP . . . . (74865) (See figure 6-32 for NHA)	REF	
- 1	3751036	. CRANKSHAFT (74865)	1	
- 2	53298	. BUSHING, Sleeve (74865)	1	
- 3	2128912	. SPROCKET (74865)	1	
- 4	6029411	. KEY, Machine (74865)	1	
- 5	2899530	. SLINGER, Oil (74865)	1	
- 6	4027425	. CAP, Main bearing, No. 1 (74865)	1	
- 7	4027427	. CAP, Main bearing, No. 3 (74865)	1	
- 8	4027428	. CAP, Main bearing, No. 4 (74865) . . . . (ATTACHING PARTS)	1	
- 9	1618695	. SCREW, Bearing cap (74865) . . . . ---*---	8	
-10	4049242	. BEARING SET, No. 1 main, std (74865)	1	
	4049243	. BEARING SET, No. 1 main, ... 0.001 in. u/s (74865)	AR	
	4049244	. BEARING SET, No. 1 main, ... 0.002 in. u/s (74865)	AR	
	4049245	. BEARING SET, No. 1 main, ... 0.003 in. u/s (74865)	AR	
	4049246	. BEARING SET, No. 1 main, ... 0.010 in. u/s (74865)	AR	
	4049248	. BEARING SET, No. 1 main, 0.012 in. u/s	AR	
-11	2049242	. BEARING SET, No. 2 and No. 4 main, ... std (74865)	2	
	2049243	. BEARING SET, No. 2 and No. 4 main, ... 0.001 in. u/s (74865)	AR	
	2049244	. BEARING SET, No. 2 and No. 4 main, ... 0.002 in. u/s (74865)	AR	
	2049245	. BEARING SET, No. 2 and No. 4 main, ... 0.003 in. u/s (74865)	AR	
	2049246	. BEARING SET, No. 2 and No. 4 main, ... 0.010 in. u/s (74865)	AR	
	2049247	. BEARING SET, No. 2 and No. 4 . . . . 0.012 in. u/s (74865)	AR	
-12	2049249	. BEARING SET, No. 3 main, std (74865)	1	
	2049250	. BEARING SET, No. 3 main, ... 0.001 in. u/s (74865)	AR	
	2049251	. BEARING SET, No. 3 main, ... 0.002 in. u/s (74865)	AR	
	2049252	. BEARING SET, No. 3 main, 0.003 in. u/s	AR	
	2049253	. BEARING SET, No. 3 main, ... 0.010 in. u/s (74865)	AR	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-38-	4049255	. BEARING SET, No. 3 main, 0.012 in. u/s (74865)	AR	
-13	1947557	. RETAINER, Rear seal (74865)	1	
		(ATTACHING PARTS)		
-14	9418004	. SCREW, Cap (74865)	2	
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-15	3549393	. SEAL, Package, rear oil (74865)	1	
-16	4027426	. CAP, Main bearing, No. 2 (74865)	1	
6-39-	3745916	TRANSMISSION ASSEMBLY, A727 Automatic (74865) (See figure 6-25 for NHA)	REF	
- 1	2464323	. PAN, Oil, transmission (74865)	1	
		(ATTACHING PARTS)		
- 2	6023355	. SCREW AND WASHER (74865)	14	
		---*---		
- 3	2464324	. GASKET, Oil pan (74865)	1	
- 4	2125890	. PLUG, Oll pan drain (74865)	1	
- 5	3769953	. GASKET, Drain plug (74865)	1	
- 6	2892408	. TUBE, Oil level indicator (74865)	1	
- 7	6030608	. SEAL, Oil level indicator tube (74865)	1	
- 8	Not Used			
- 9	2466302	. INDICATOR, Oil level dipstick (74865)	1	
-10	4057750	. SWITCH, Neutral start (74865)	1	
-11	2408143	. WASHER, Seal (74865)	1	
-12	No Number	. VALVE BODY AND RELATED PARTS (74865) (See figure 6-41 for details)	1	
		(ATTACHING PARTS)		
-13	179798	. BOLT, Hex head (74865)	10	
		---*---		
-14	3515079	. SPRING, Accumulator piston (74865)	1	
-15	1315158	. RING, Accumulator piston, large (74865)	1	
-16	3410908	. PISTON, Accumulator (74865)	1	
-17	1941831	. RING, Accumulator piston, small (74865)	1	
-18	2659464	. PLUG, Speedometer drive hole (74865)	1	
-19	6025752	. SEAL, Plug (74865)	1	
-20	2892399	. RETAINER, Plug (74865)	1	
		(ATTACHING PARTS)		
-21	6022225	. SCREW AND WASHER (74865)	1	
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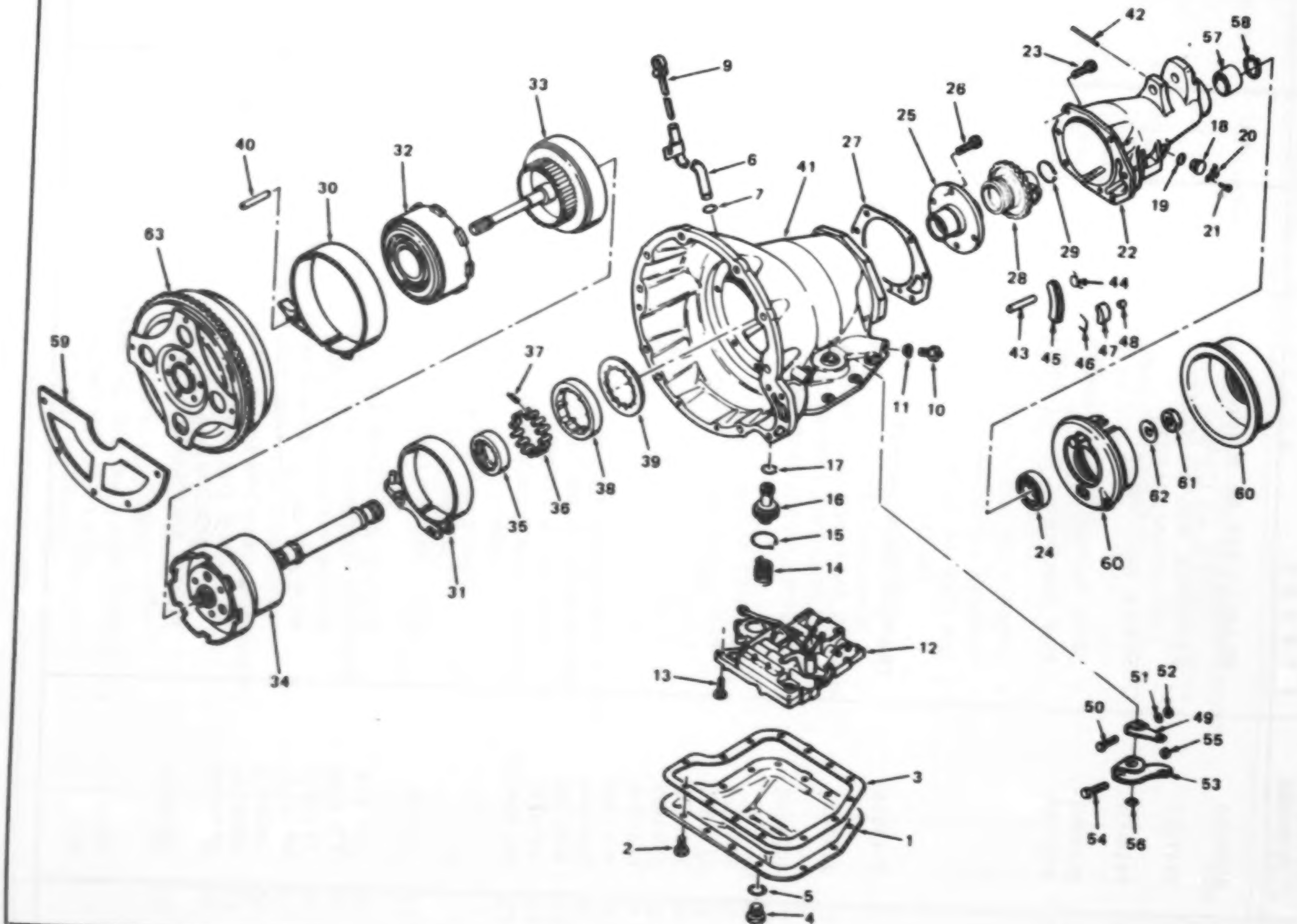
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Figure 6-29. Transmission Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-39-22	3496595	. EXTENSION, Housing (74865)	1	
		(ATTACHING PARTS)		
-23	6027150	. SCREW AND WASHER (74865).	6	
		---*---		
-24	2205080	. SEAL, Output shaft (74865)	1	
-25	2466882	. SUPPORT, Output shaft (74865)	1	
		(ATTACHING PARTS)		
-26	179818	. SCREW AND WASHER (74865).	4	
		---*---		
-27	2466954	. GASKET, Extension (74865)	1	
-28	No Number	. GOVERNOR BODY AND SUPPORT . . . . ASSEMBLY (74865) (See figure 6-44 for details)	1	
-29	6022817	. RING, Retaining (74865)	1	
-30	No Number	. KICKDOWN BAND AND SERVO (74865). . (See figure 6-42 for details)	1	
-31	No Number	. REVERSE BAND AND SERVO (74865) . . (See figure 6-43 for details)	1	
-32	No Number	. CLUTCH ASSEMBLY, Front (74865). . . . (See figure 6-45 for details)	1	
-33	No Number	. INPUT SHAFT AND CLUTCH ASSEMBLY . (74865) (See figure 6-46 for details)	1	
-34	No Number	. OUTPUT SHAFT AND GEAR TRAIN ASSY . (74865) (See figure 6-47 for details)	1	
-35	3420100	. PACKAGE, Race inner (74865)	1	
-36	670776	. . ROLLER, Clutch (74865) (N.S.S.)	12	
-37	1942187	. . SPRING, Clutch roller (74865) (N.S.S.) . .	12	
-38	1942095	. CAM, Clutch (74865)	1	
-39	2801426	. RETAINER, Clutch spring (74865).	1	
-40	1942132	. SHAFT, Kickdown lever (74865)	1	
-41	3736630	. CASE, Transmission (74865)	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABL ON CODE
6-39-42	141160	. PIN, Brake anchor to case (74865)	1	
-43	2466892	. SHAFT, Parking sprag (74865)	1	
-44	2466909	. SPRING, Parking sprag (74865)	1	
-45	2801157	. SPRAG, Parking (74865)	1	
-46	2538034	. RING, Snap (74865)	1	
-47	2538042	. PLUG, Parking sprag reaction (74865)	1	
-48	456636	. PIN, Parking sprag reaction plug (74865)	1	
-49	2899370	. LEVER, Transmission throttle control (74865)	1	
		(ATTACHING PARTS)		
-50	181568	. BOLT, Throttle lever (74865)	1	
-51	127797	. NUT, Throttle lever (74865)	1	
-52	121753	. WASHER, Lock, throttle lever (74865)	1	
		---*---		
-53	2514451	. LEVER, Manual control (74865)	1	
		(ATTACHING PARTS)		
-54	180034	. SCREW AND WASHER (74865)	1	
-55	131395	. NUT (74865)	1	
		---*---		
-56	3878447	. SEAL, Manual valve shaft (74865)	1	
-57	1672194	. BEARING, Extension (74865)	1	
-58	1736432	. RING, Extension bearing snap (74865)	1	
-59	3878973	COVER, Case (74865) (See figure 6-25-123)	REF	
-60	34527	BRAKE ASSEMBLY, Parking (See figure 6-40 for details)	1	
		(ATTACHING PARTS)		
-61	2125080	NUT, Hex, plain (74865)	1	
-62	2204543	WASHER, Tabbed (74865)	1	
		---*---		
-63	No Number	TORQUE CONVERTER, OIL PUMP, AND REACTION SHAFT ASSEMBLY (74865) (See figure 6-48 for details)	1	

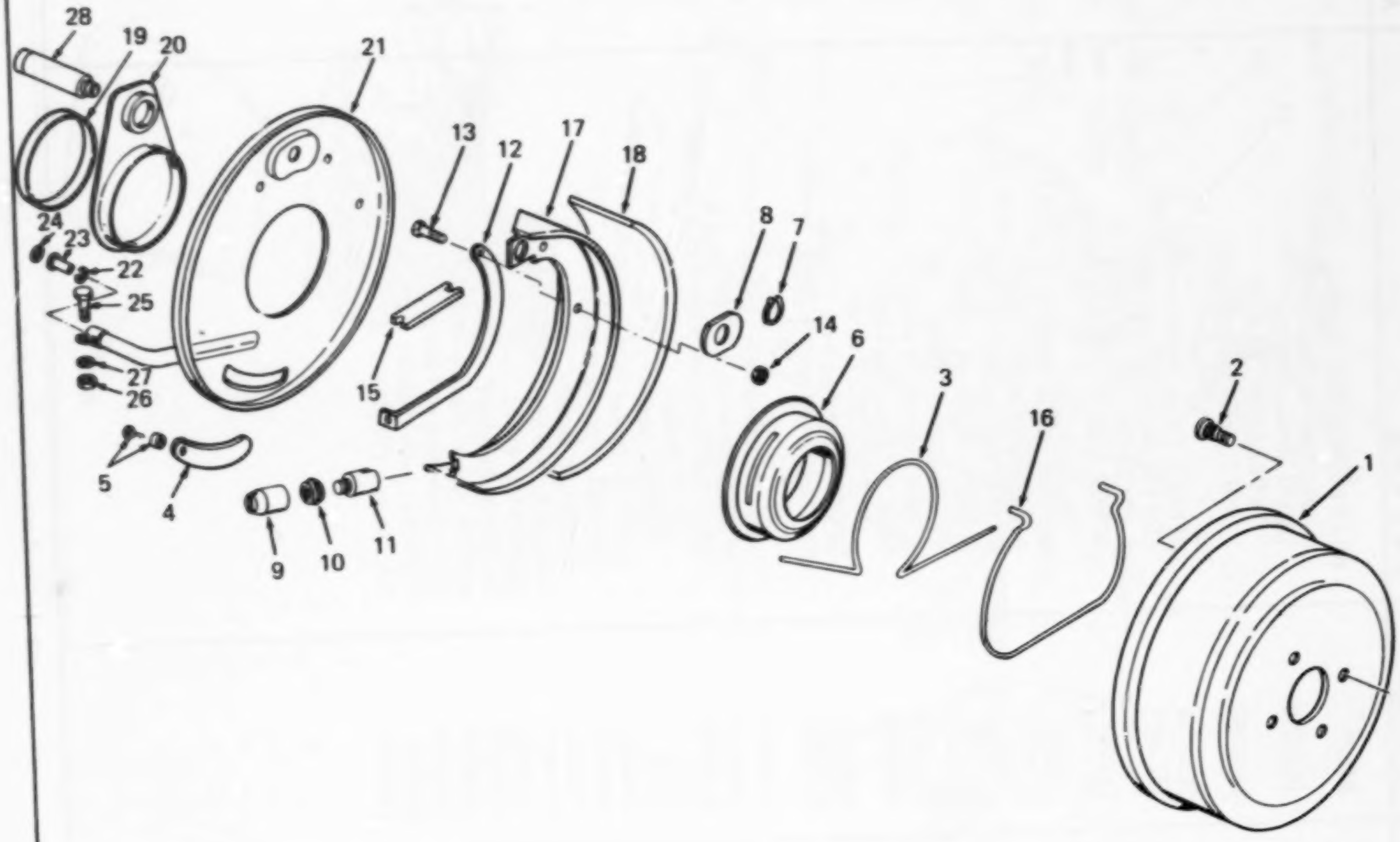
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Figure 6-40. Parking Brake Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABL ON CODE
6-40-	34527	BRAKE ASSEMBLY, Parking (See figure 6-39 for NHA)	REF	
- 1	1949579	. DRUM, Brake (74865)	1	
		(ATTACHING PARTS)		
- 2	1946283	. . BOLT, Brake drum (74865)	4	
		---*---		
- 3	1530775	. SPRING, Grease shield (74865)	1	
- 4	1317858	. COVER, Adjusting nut (74865)	1	
		(ATTACHING PARTS)		
- 5	181561	. SCREW AND WASHER (74865)	2	
		---*---		
- 6	1488901	. SHIELD, Grease (74865)	1	
- 7	600983	. WASHER, Retaining (74865)	1	
- 8	1403574	. GUIDE, Brake anchor (74865)	2	
- 9	1314476	. SLEEVE, Adjuster (74865)	1	
-10	1314477	. NUT, Adjuster (74865)	1	
-11	1314478	. SCREW, Adjuster (74865)	1	
-12	2227695	. LEVER, Operating (74865)	1	
		(ATTACHING PARTS)		
-13	1929685	. SCREW, Operating lever (74865)	1	
-14	2129684	. NUT, Operating lever (74865)	1	
		---*---		
-15	1406677	. LINK, Operating lever (74865)	1	
-16	1403611	. SPRING, Shoe return (74865)	1	
	3822332	. SHOE AND LINING ASSEMBLY (74865)	2	
-17	N.S.S.	. . SHOE, Brake	1	
-18	N.S.S.	. . LINING, Brake	1	
-19	1488890	. SLEEVE, Spacer (74865)	1	
-20	1488889	. SPACER, Support (74865)	1	
-21	1738221	. SUPPORT, Brake (74865)	1	
-22	1406975	WASHER, Bushing (74865)	1	
-23	1406934	BUSHING (74865)	1	
-24	1406976	WASHER, Bushing (74865)	1	
-25	1929658	SCREW, Guide clamp (74865)	1	
-26	2129684	NUT, Guide clamp (74865)	1	
-27	600983	WASHER, Lock (74865)	1	
-28	1488884	PIN, Anchor (74865)	1	

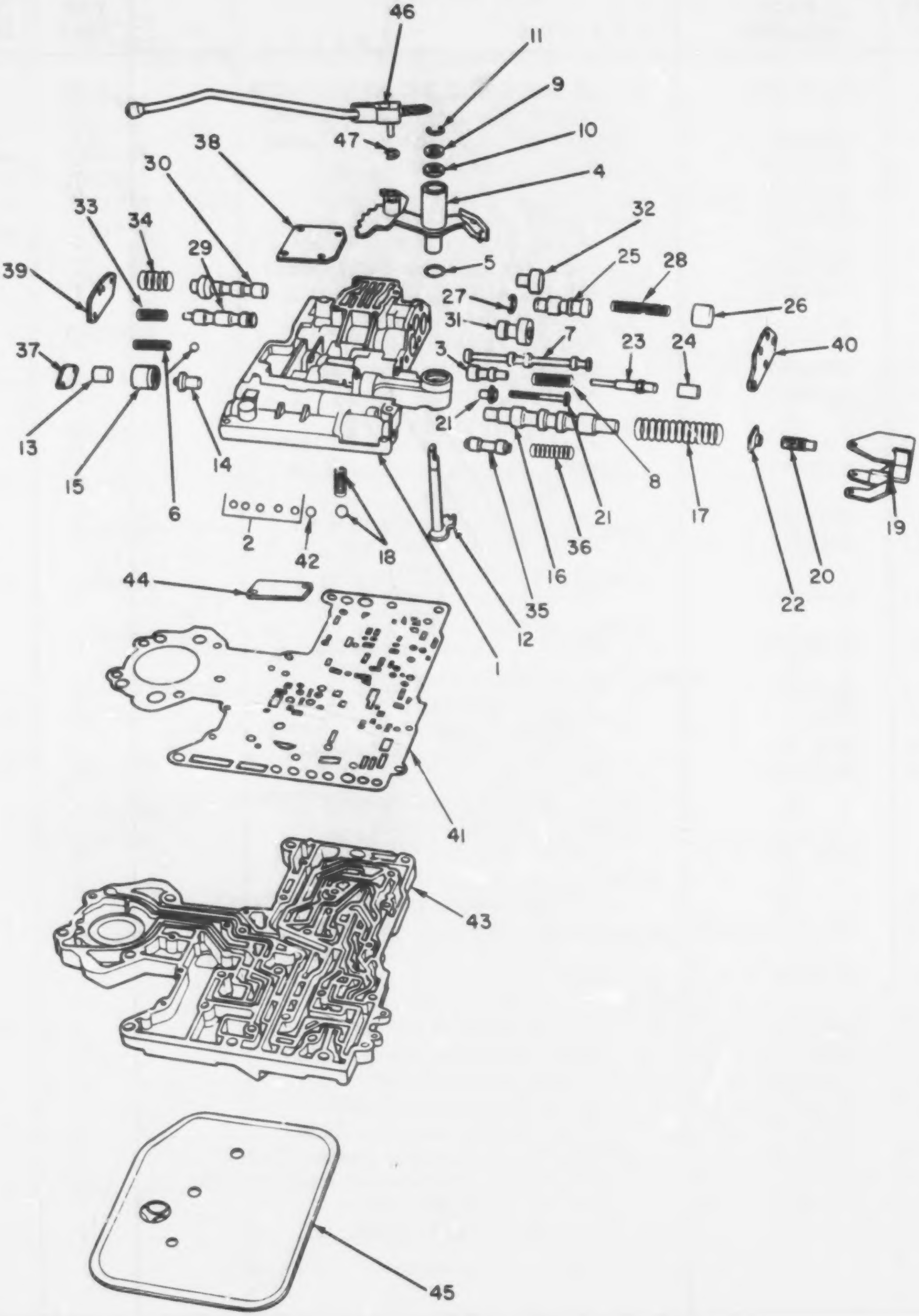
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Figure 6-41. Valve Body and Transfer Plate Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABL ON CODE
6-41	No Number	VALVE BODY AND RELATED PARTS (74865) (See figure 6-39 for NHA)	REF	
	4058661	. VALVE BODY ASSEMBLY (74865)	1	
- 1	3743187	. . BODY, Valve (74865) (NSS)	1	
- 2	3743521	. . BALL (74865) (NSS)	5	
- 3	2801259	. . VALVE, Manual (74865)	1	
- 4	3410484	. . LEVER, Manual valve (74865)	1	
- 5	3878447	. . SEAL, Manual valve shaft (74865)	1	
- 6	2466615	. . SPRING AND BALL, Manual valve detent (74865)	1	
- 7	3743092	. . VALVE, Throttle (74865)	1	
- 8	2892350	. . SPRING, Throttle valve (74865)	1	
- 9	2538062	. . WASHER, Throttle valve lever shaft (74865)	1	
-10	2466548	. . SEAL, Throttle valve shaft (74865)	1	
-11	6025857	. . RING, Throttle valve lever shaft snap (74865)	1	
-12	3681227	. . LEVER, Throttle valve (74865)	1	
-13	1942218	. . PLUG, Regulator valve line pressure (74865)	1	
-14	1942245	. . PLUG, Regulator valve throttle pressure (74865)	1	
-15	1942213	. . SLEEVE, Regulator valve line pressure plug (74865)	1	
-16	2240685	. . VALVE, Regulator (74865)	1	
-17	2121734	. . SPRING, Regulator valve (74865)	1	
-18	2892846	. . SPRING, Pressure relief (74865)	1	
-19	3681319	. . BRACKET, Throttle pressure adjusting screw (74865)	1	
		(ATTACHING PARTS)		
	6029271	. . SCREW AND WASHER (74865)	3	
		---*---		
-20	2124736	. . SCREW, Line pressure adjusting (74865)	1	
-21	3681242	. . SCREW AND NUT ASSEMBLY, Throttle pressure adjusting (74865)	1	
-22	2124737	. . NUT, Line pressure adjusting screw (74865)	1	
-23	2892351	. . VALVE, Kickdown (74865)	1	
-24	2892352	. . PLUG, Kickdown detent (74865)	1	
-25	2892926	. . VALVE, Shuttle (74865)	1	
-26	2892927	. . PLUG, Shuttle valve (74865)	1	
-27	6025857	. . RING, Shuttle valve stop (74865)	1	
-28	3681252	. . SPRING, Shuttle valve primary (74865)	1	
	3515048	. . SPRING, Shuttle valve secondary (74865)	1	
-29	3410881	. . VALVE, 1-2 Shift (74865)	1	
-30	3515132	. . VALVE, 2-3 Shift (74865)	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-41-31	3515948	. . PLUG, 1-2 Shift valve (74865)	1	
-32	2892990	. . PLUG, 2-3 Shift valve (74865)	1	
-33	2204547	. . SPRING, 1-2 Shift valve (74865)	1	
-34	1942231	. . SPRING, 2-3 Shift valve (74865)	1	
-35	2124256	. . VALVE, Torque converter control (74865)	1	
-36	2124257	. . SPRING, Torque converter control valve (74865)	1	
-37	2205034	. . COVER, Regulator valve (74865)	1	
		(ATTACHING PARTS)		
	6029926	. . SCREW AND WASHER (74865)	2	
		---*---		
-38	6030888	. . COVER, Shuttle valve (74865)	1	
		(ATTACHING PARTS)		
	6029271	. . SCREW AND WASHER (74865)	4	
		---* ---		
-39	3410378	. . COVER, Shift valve plug (74865)	1	
		(ATTACHING PARTS)		
	6029926	. . SCREW AND WASHER (74865)	3	
		---*---		
-40	2892944	. . COVER, Governor plug (74865)	1	
		(ATTACHING PARTS)		
	6030888	. . SCREW AND WASHER (74865)	5	
		---*---		
-41	3743161	. . PLATE, Valve body separator (74865)	1	
-42	3515398	. . BALL, Valve body check valve, large (74865)	1	
-43	3743159	. . PLATE, Transfer (74865)	1	
		(ATTACHING PARTS)		
	6030888	. . SCREW AND WASHER (74865)	2	
	6030889	. . SCREW AND WASHER (74865)	14	
		---*---		
-44	3410380	. . SUPPORT, Transfer plate (74865)	1	
		(ATTACHING PARTS)		
	6029271	. . SCREW AND WASHER ASSEMBLY (74865).	2	
		---*---		

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-41-45	3515996	. FILTER, Transmission oil (74865)	1	
		(ATTACHING PARTS)		
.	6030895	. SCREW AND WASHER (74865)	3	
		---*---		
-46	2466894	. ROD, Parking sprag (74865)	1	
-47	1626749	. E-RING, Parking sprag rod (74865)	1	

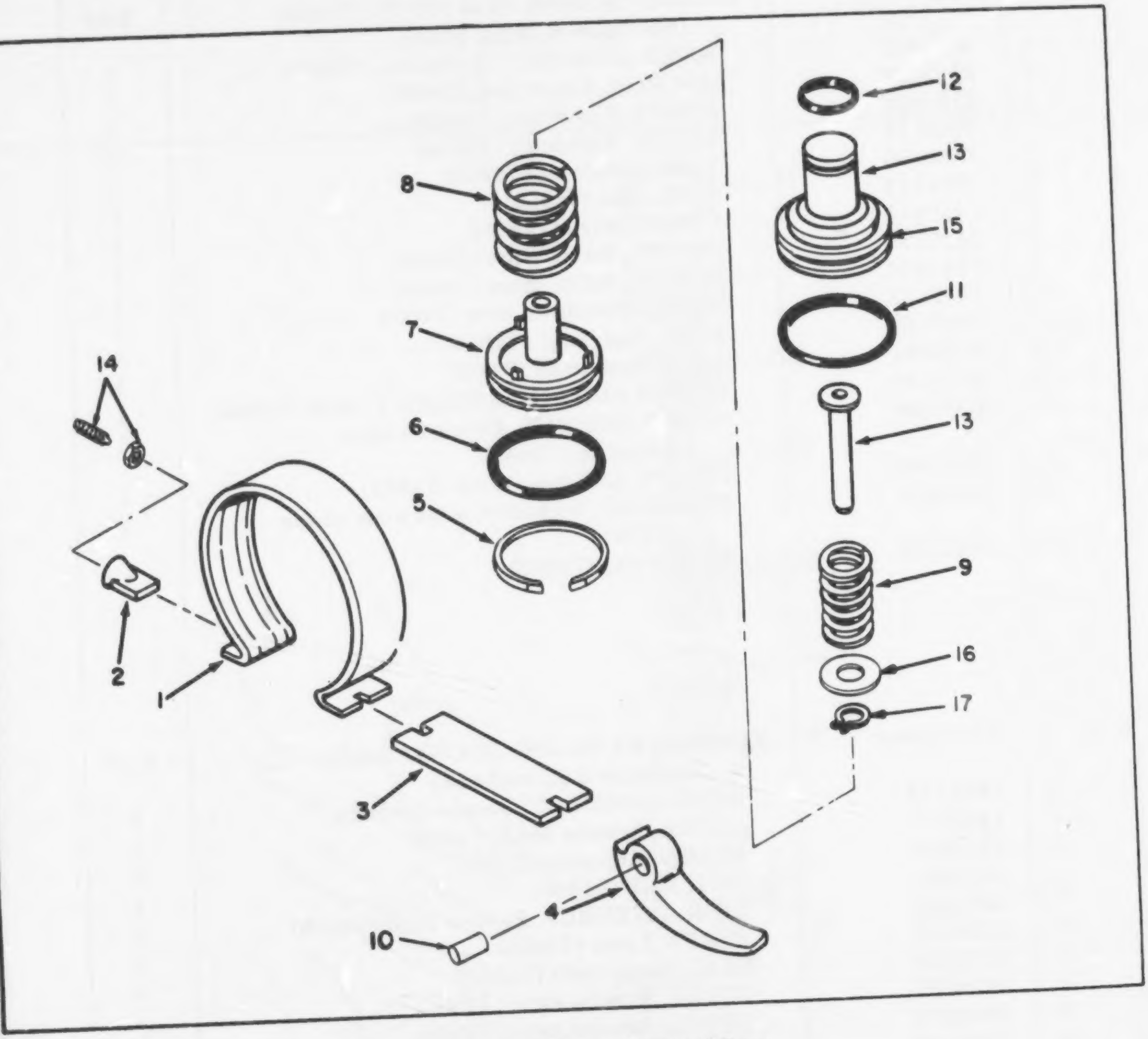
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Figure 6-42. Kickdown Band and Servo

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-42-	No Number	KICKDOWN BAND AND SERVO (74865) . . . . (See figure 6-39 for NHA)	REF	
-1	3621491	. BAND ASSEMBLY, Kickdown (74865)	1	
- 2	3743338	. ANCHOR, Screw lock (74865)	1	
- 3	2124848	. STRUT, Kickdown (74865)	1	
- 4	3515116	. LEVER, Kickdown (74865)	1	
- 5	1942130	. RING, Retaining (74865)	1	
- 6	1942123	. RING, Seal (74865)	1	
- 7	3410441	. GUIDE, Servo (74865)	1	
- 8	3410518	. SPRING, Servo, outer (74865)	1	
- 9	3410444	. SPRING, Servo, inner (74865)	1	
-10	1942132	. SHAFT, Kickdown lever (74865	1	
-11	1942123	. RING, Seal, large (74865)	1	
-12	2124851	. RING, Seal, small (74865)	1	
-13	3410445	. PISTON AND ROD ASSEMBLY, inner (74865) .	1	
-14	2400389	. SCREW AND NUT, Kickdown band . . . . . adjusting (74865)	1	
-15	3410440	. PISTON, Kickdown servo (74865)	1	
-16	3410437	. RETAINER, Kickdown servo inner piston . . . (74865)	1	
-17	1942130	. RING, Snap (74865)	1	
6-43-	No Number	REVERSE BAND AND SERVO (74865) . . . . . (See figure 6-39 for NHA)	REF	
- 1	1942133	. BAND ASSEMBLY, Reverse (74865)	1	
- 2	1942137	. LEVER, Reverse band (74865)	1	
- 3	1942141	. SCREW, Adjusting (74865)	1	
- 4	271506	. NUT, Lock (74865)	1	
- 5	2204820	. LINK ASSEMBLY, Reverse band (74865) . . .	1	
- 6	2124857	. SHAFT, Lever (74865)	1	
- 7	1672358	. SEAL, Lever shaft (74865).	1	
- 8	2204823	. STRUT, Reverse band (74865)	1	
- 9	2892233	. LEVER, Reverse band (74865)	1	
-10	1942130	. RING, Retaining (74865)	1	
-11	1942150	. RETAINER, Spring (74865)	1	
-12	2801241	. SPRING, Servo piston (74865)	1	
-13	6027153	. RING, Plug (74865)	1	
-14	3743353	. PLUG, Piston (74865)	1	
-15	3743580	. SPRING, Plug cushion (74865)	1	
-16	2801281	. PISTON, Reverse servo (74865)	1	
-17	2464481	. SEAL, Piston (74865)	1	

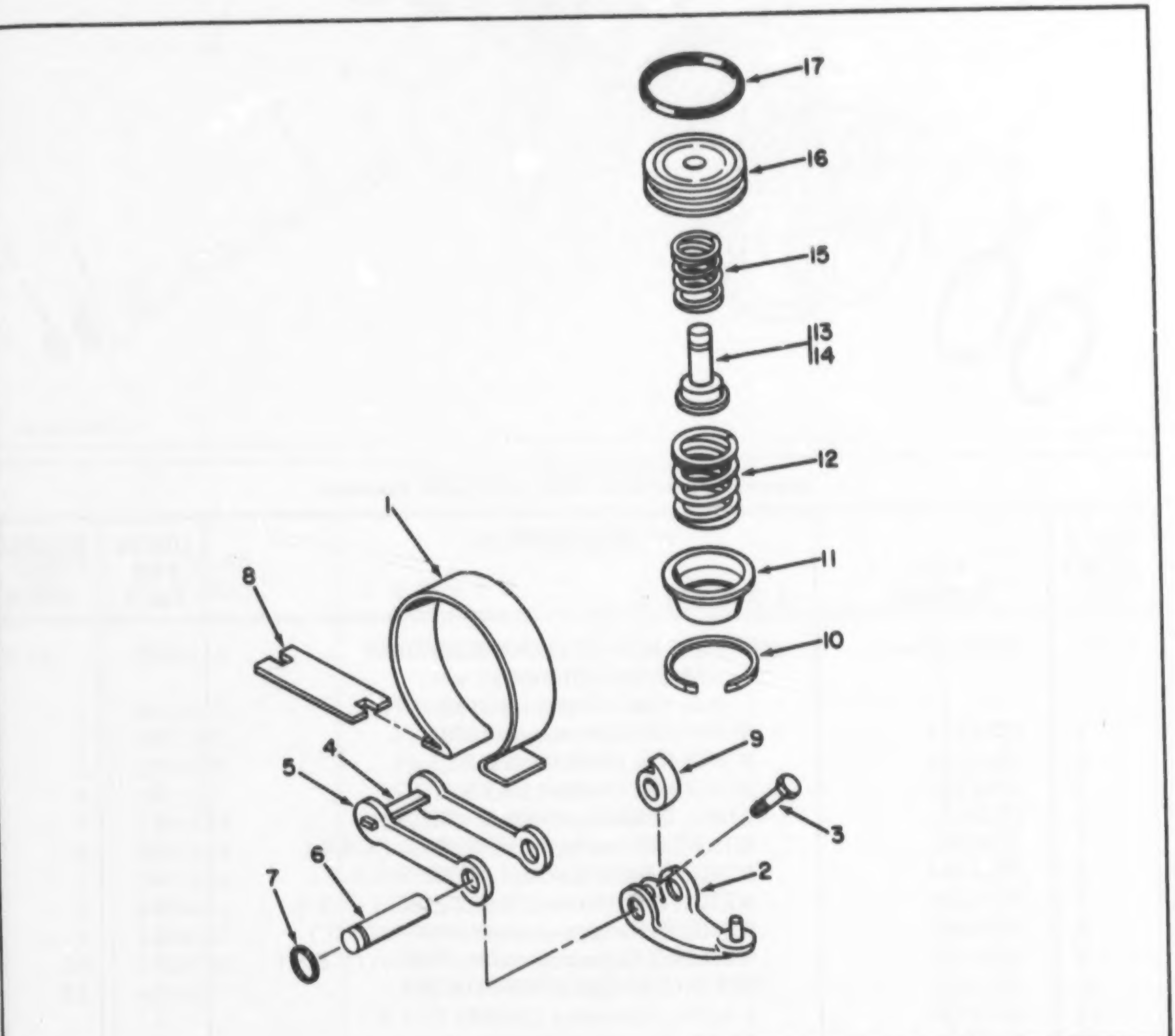
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Figure 6-43. Reverse Band and Servo

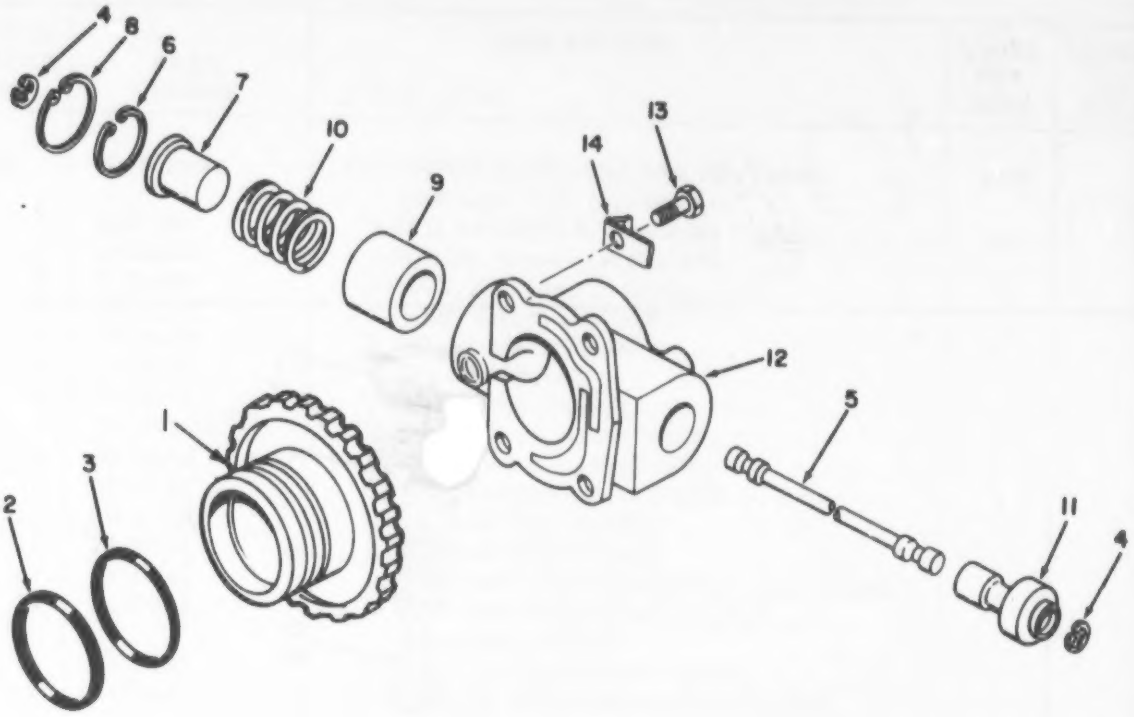

Figure 6-44. Governor Body and Support Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-44	No Number	GOVERNOR BODY AND SUPPORT . . . . . ASSEMBLY (74865) (See figure 6-39 for NHA)	REF	
- 1	3743517	. SUPPORT, Governor (74865)	1	
- 2	1942109	. RING, Seal (74865) (N.S.S.)	1	
- 3	1942109	. RING, Seal (74865) (N.S.S.)	1	
- 4	1638461	. RING, Retaining (74865) (N.S.S.)	2	
- 5	1556082	. SHAFT, Governor valve (74865) (N.S.S.) . .	1	
- 6	1636464	. RING, Retaining, inner (74865) (N.S.S.). . .	1	
- 7	3515482	. WEIGHT, Governor, inner (74865) (N.S.S.) .	1	
- 8	1636465	. RING, Retaining, outer (74865) (N.S.S.). . .	1	
- 9	1636461	. WEIGHT, Governor, outer (74865) (N.S.S.) .	1	
-10	3515127	. SPRING, Weight (74865) (N.S.S.)	1	
-11	3515479	. VALVE, Governor (74865) (N.S.S.)	1	
-12	N.S.S.	. BODY, Governor (74865) (N.S.S.) . . . . . (serviced in 4106587) (ATTACHING PARTS)	1	
-13	179794	. BOLT, Govenor body (74865) (N.S.S.) . . .	4	
-14	3743520	. LOCK, Body bolt (74865) (N.S.S.) . . . . . ---*---	2	
	4106587	. REPAIR PACKAGE, Governor (74865) . . . (includes items 2 thru 14)	AR	

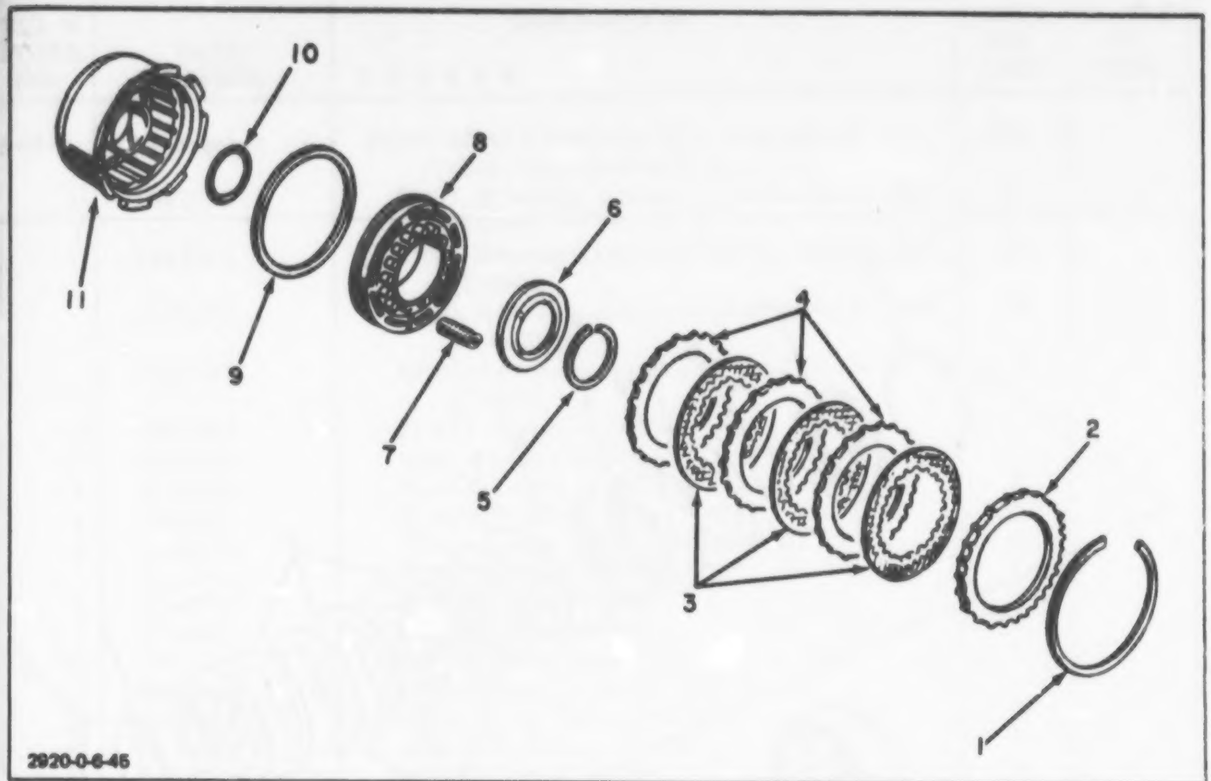

Figure 6-45. Front Clutch Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-45-	3515310	CLUTCH ASSEMBLY, Front (74865) . . . . (See figure 6-39 for NHA)	REF	
- 1	3410570	. RING, Retaining (74865)	1	
- 2	2801961	. PLATE, Pressure (74865)	1	
- 3	2124826	. PLATE, Front clutch (74865)	3	
- 4	2801167	. DISC, Front clutch (74865)	3	
- 5	2124824	. RING, Retaining (74865)	1	
- 6	2801949	. RETAINER, Spring (74865)	1	
- 7	2801243	. SPRING, Piston (74865)	11	
- 8	2464651	. PISTON, Clutch (74865)	1	
- 9	3743237	. SEAL, Piston, outer (74865)	1	
-10	3410226	. SEAL, Piston, inner (74865)	1	
-11	4058437	. RETAINER W/BUSHING (74865)	1	

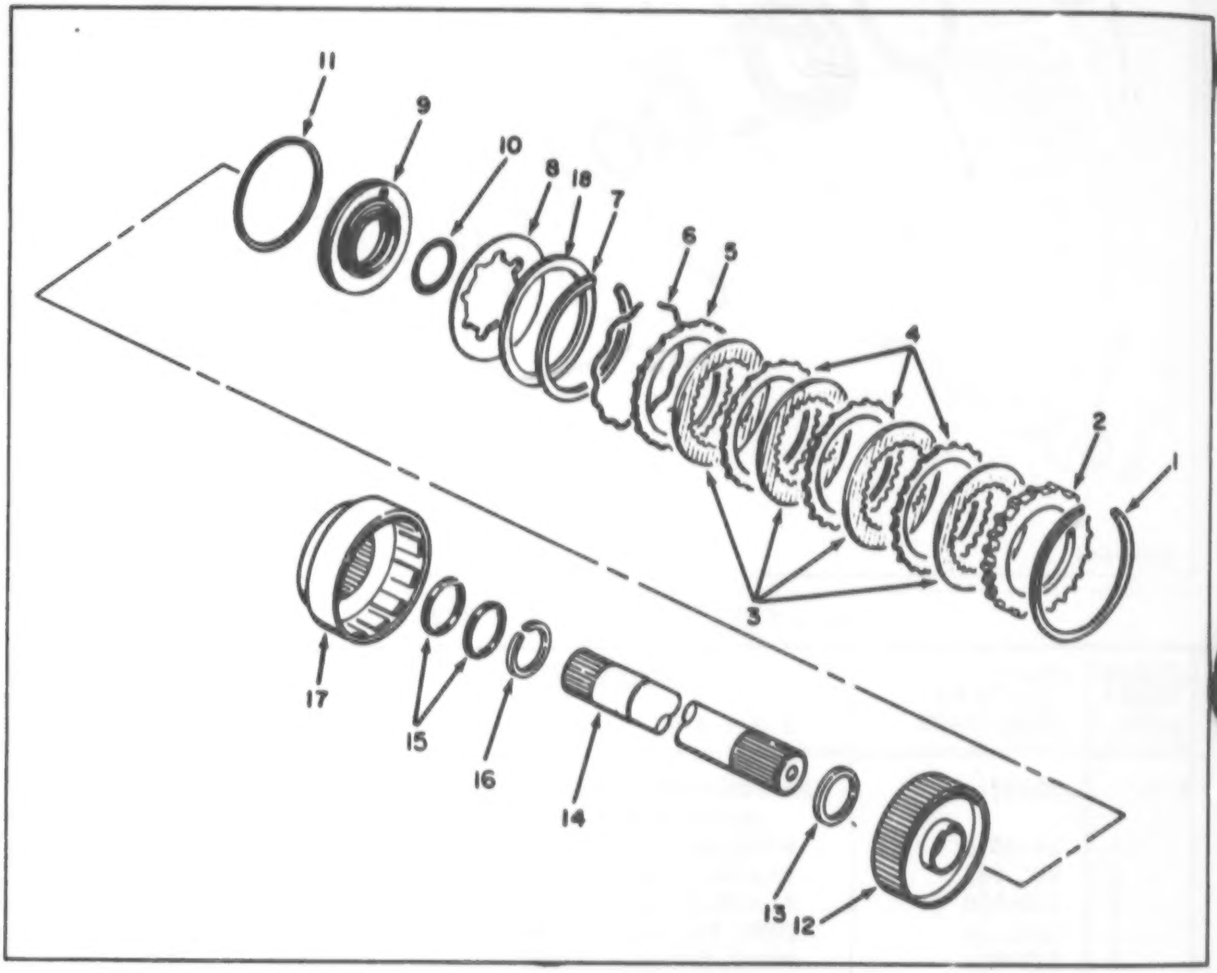
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Figure 6-46. Input Shaft and Clutch Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-46-	No Number	INPUT SHAFT AND CLUTCH ASSEMBLY (74865) (See figure 6-39 for NHA)	REF	
- 1	1942063	. RING, Retaining, selective (0.060-0.062 in. thk) (74865)	1	
	1942064	. RING, Retaining, selective (0.074-0.076 in. thk) (74865)	AR	
	1942065	. RING, Retaining, selective (0.088-0.108 in. thk) (74865)	AR	
	2466811	. RING, Retaining, selective (0.106-0.108 in. thk) (74865)	AR	
- 2	2801961	. PLATE, Pressure (74865)	1	
- 3	2801992	. DISC, Clutch (74865)	4	
- 4	2124826	. PLATE, Clutch (74865)	3	
- 5	2466803	. PLATE, Pressure, front (74865)	1	
- 6	2466806	. SPRING, Rear clutch, wave (74865)	1	
- 7	2466811	. RING, Retaining (74865)	1	
- 8	3743621	. SPRING, Disc (74865)	1	
- 9	3743624	. PISTON, Clutch (74865)	1	
-10	1942054	. SEAL, Piston, inner (74865)	1	
-11	2124835	. SEAL, Piston, outer (74865)	1	
-12	4028299	. RETAINER, Piston (74865)	1	
-13	2204622	. WASHER, Thrust (74865)	1	
-14	4058665	. SHAFT, Input (74865)	1	
	3681709	. . BUSHING, Input shaft (74865)	1	
-15	2801054	. RING, Seal (74865)	2	
-16	2124872	. RING, Retaining (74865)	1	
-17	3743622	. RETAINER, Clutch (74865)	1	
-18	3515077	. SPACER, Rear clutch piston spring (74865)	1	

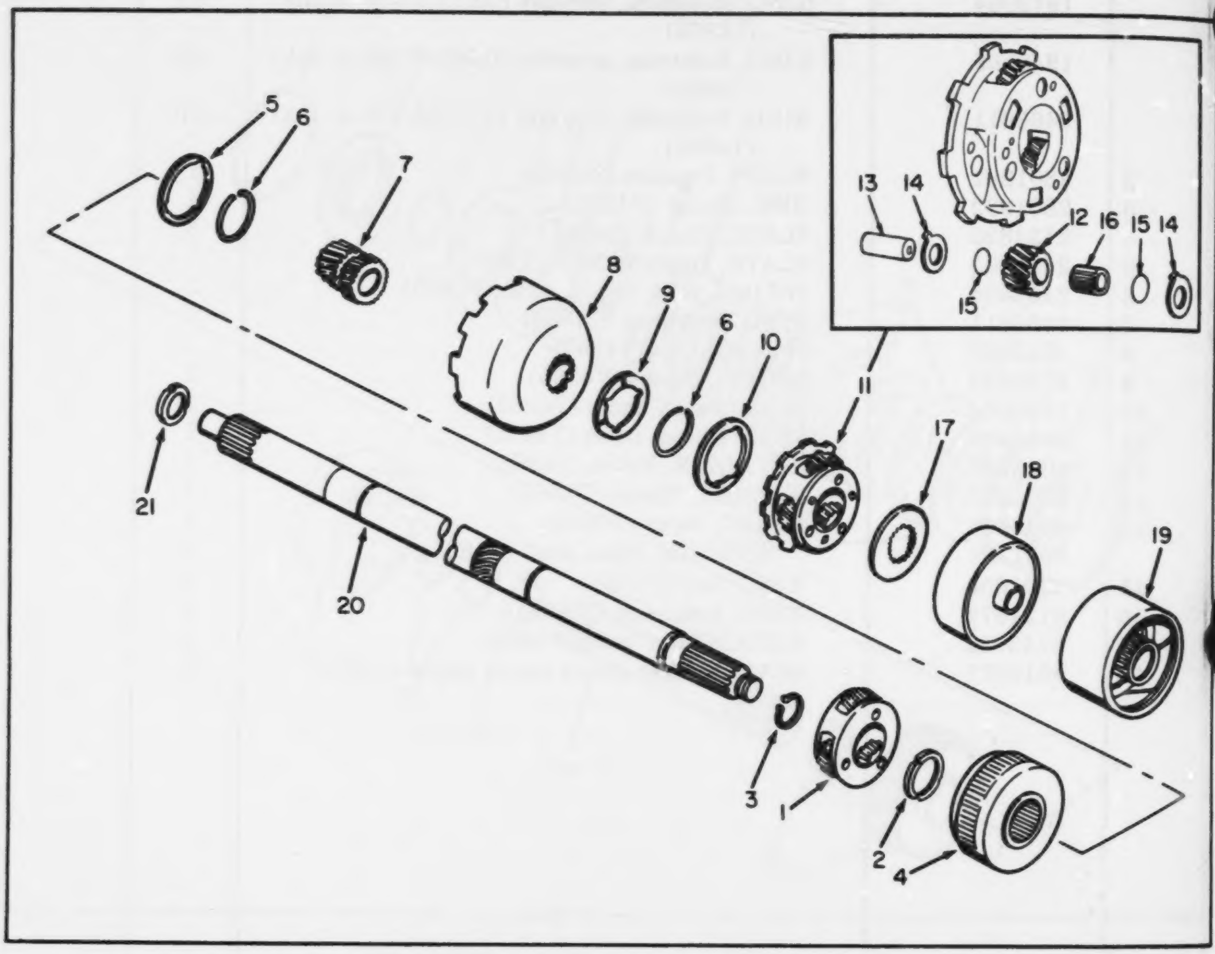
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Figure 6-47. Output Shaft and Gear Train Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-47-	No Number	OUTPUT SHAFT AND GEAR TRAIN ASSEMBLY (74865) (See figure 6-39 for NHA)	REF	
- 1	4028110	. CARRIER, Front planet (74865)	1	
	2400667	. . PINION, Front planet carrier (74865)	3	
	2464178	. . SHAFT, Pinion (74865)	3	
	2801315	. . WASHER, Pinion carrier thrust (74865)	6	
	2204649	. . RING, Pinion roller thrust (74865)	6	
	2204647	. . ROLLER, Pinion (74865)	3	
- 2	1942081	. WASHER, Thrust (74865)	1	
- 3	6030982	. RING, Retaining (74865)	AR	
	6024311	. RING, Retaining (0.057 in. thk) (74865)	AR	
	6024312	. RING, Retaining (0.064 in. thk) (74865)	AR	
- 4	2892656	. GEAR ASSEMBLY, Front annulus (74865)	1	
- 5	1942081	. WASHER, Thrust (74865)	1	
- 6	1736521	. RING, Retaining (74865)	2	
- 7	2801311	. GEAR, Sun (74865)	1	
- 8	2400662	. SHELL, Sun gear (74865)	1	
- 9	1942080	. WASHER, Thrust (74865)	1	
-10	1942081	. WASHER, Thrust (74865)	1	
-11	2466539	. CARRIER, Rear planet (74865)	1	
-12	2400667	. . PINION, Rear planet carrier (74865)	3	
-13	2464178	. . SHAFT, Pinion (74865)	3	
-14	2801315	. . WASHER, Pinion carrier thrust (74865)	6	
-15	2204649	. . RING, Pinion Roller thrust (74865)	6	
-16	2204647	. . ROLLER, Pinion (74865)	3	
-17	2400580	. PLATE, Thrust (74865)	1	
-18	2538185	. GEAR ASSEMBLY, Rear annulus (74865)	1	
-19	3515451	. DRUM, Reverse (74865)	1	
-20	4106596	. SHAFT, Output (74865)	1	
-21	2400843	. WASHER, Thrust (74865)	1	
	4058946	. PLATE, Output shaft (74865) (not illustrated)	1	

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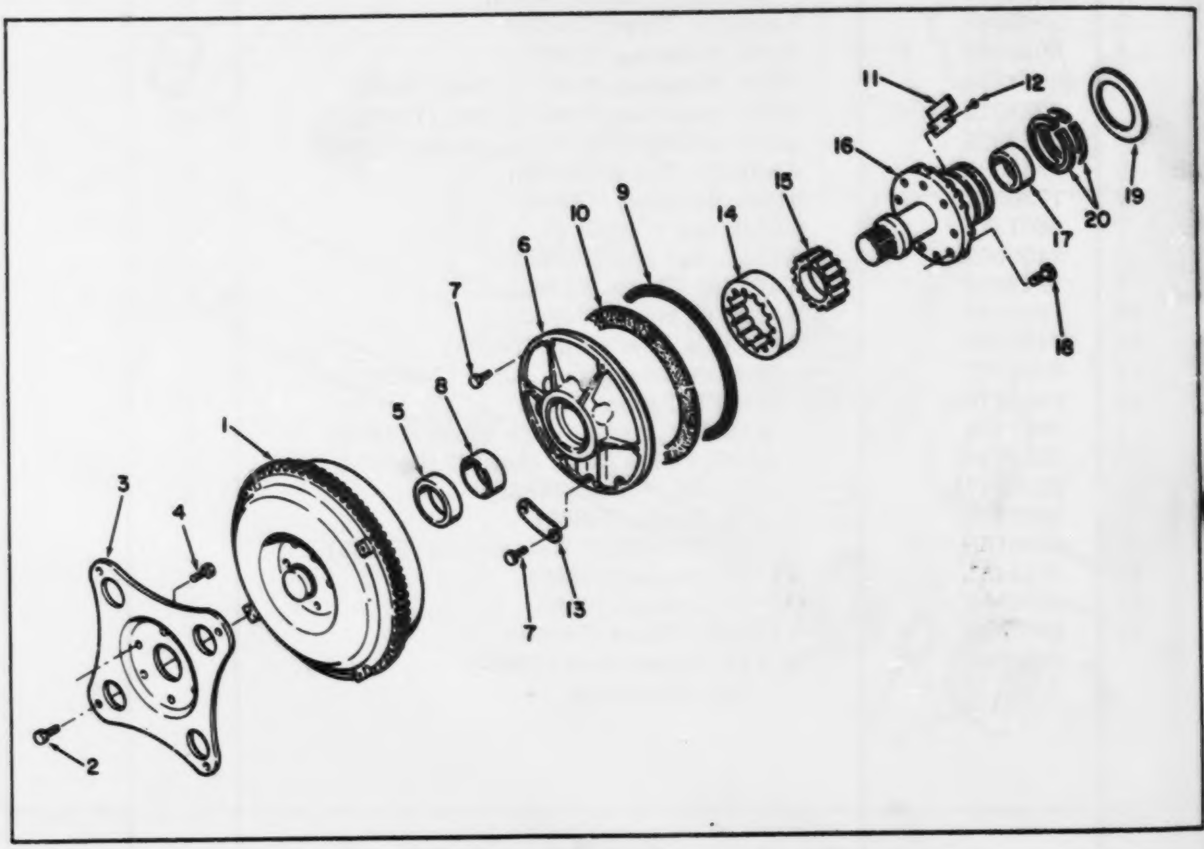
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Figure 6-48. Torque Converter, Oil Pump and Reaction Shaft Group

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-48-	No Number	TORQUE CONVERTER, OIL PUMP AND REACTION SHAFT GROUP (74865) . . . (See figure 6-39 for NHA)	REF	
- 1	4058695	. TORQUE CONVERTER ASSEMBLY (74865) . (ATTACHING PARTS)	REF	
- 2	1949765	. SCREW, Cap, hex head (74865) . . . . . . ---*---	4	
	2863497	. . GEAR, Torque converter starter ring . . . . (74865)	1	
- 3	4058428	. PLATE, Drive (74865) . . . . (ATTACHING PARTS)	REF	
- 4	1949424	. SCREW, Cap, hex head (74865) . . . . . . ---*---	6	
- 5	3515137	. SEAL, Impeller hub (74865)	1	
- 6	4028270	. OIL PUMP HOUSING ASSEMBLY (74865) . . (ATTACHING PARTS)	1	
- 7	6023943	. SCREW AND WASHER (74865) . . . . . . ---*---	1	
- 8	2466324	. BUSHING, Pump housing (74865)	1	
- 9	1942021	. PACKING, Preformed, oil pump (74865) . . .	7	
-10	4028377	. GASKET, Pump housing (74865)	1	
-11	3420087	. BAFFLE, Vent (74865) . . . . (ATTACHING PARTS)	1	
-12	145067	. SCREW, Drive (74865) . . . . ---*---	1	
-13	2204993	. SHIELD, Housing vent (74865)	1	
	2892679	. SHIELD ASSEMBLY, Transmission vent (74865)	1	
	3780239	. ROTOR SET, Oil pump (74865)	1	
-14	N.S.S.	. . ROTOR, Oil pump, outer (74865) (NSS) . .	1	
-15	N.S.S.	. . ROTOR, Oil pump, inner (74865) (NSS) . .	1	
-16	4058929	. REACTION SHAFT AND SUPPORT ASSEMBLY (74865)	1	
-17	2801348	. . BUSHING, Reaction shaft (74865)	1	
-18	179815	. BOLT, Hex head (74865)	6	
-19	2204622	. WASHER, Thrust, selective (0.060 in. thk) . . . (74865)	AR	
	2204623	. WASHER, Thrust, selective (0.085 in. thk) . . . (74865)	AR	
	2400284	. WASHER, Thrust, selective (0.102 in thk) . . .	AR	
-20	3743689	. RING, Seal (74865)	2	

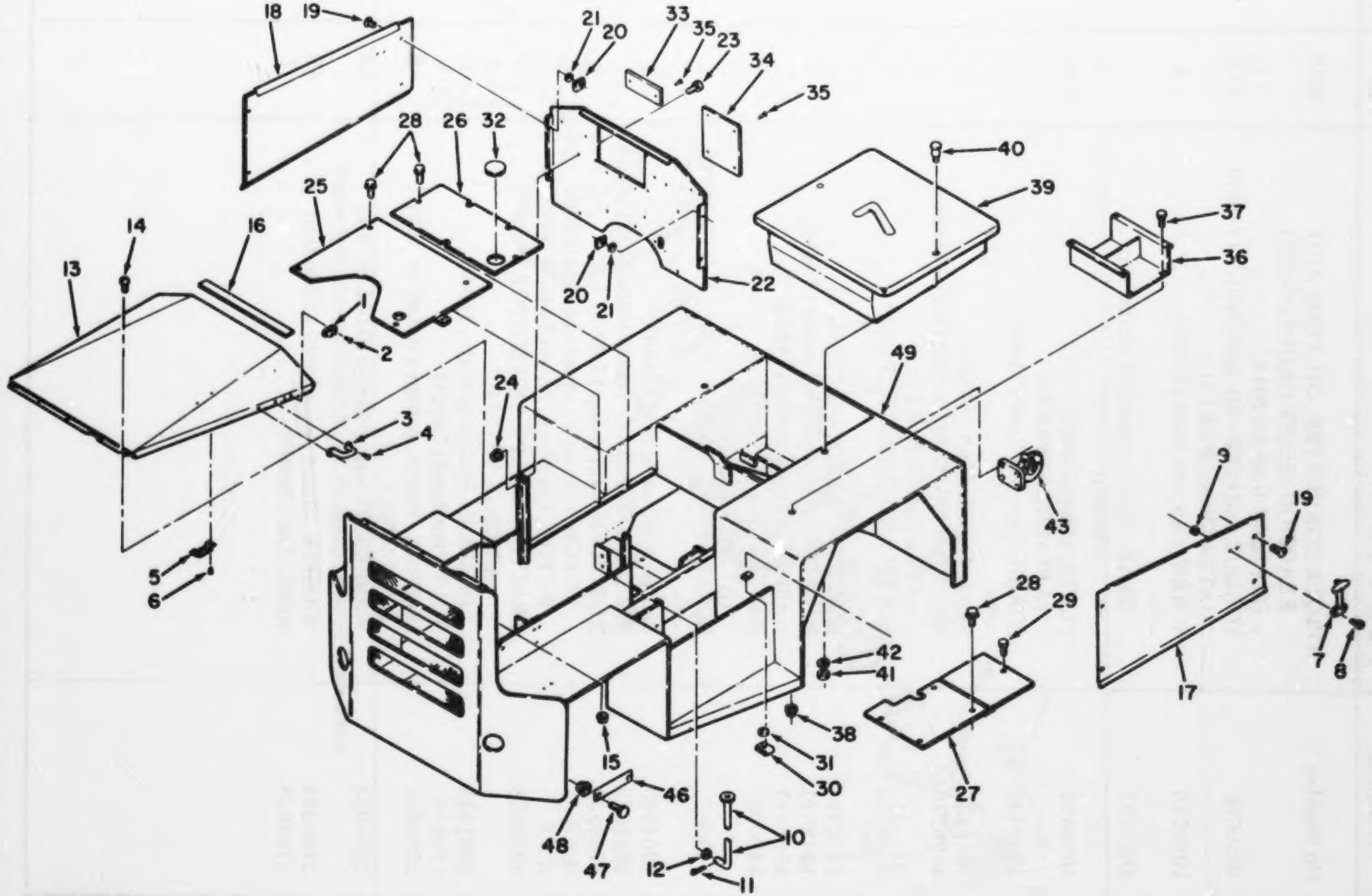
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Figure 6-49. Frame and Sheet Metal Parts

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-49-	No Number	FRAME AND SHEET METAL PARTS	REF	
		(See figure 6-1 for NHA)		
- 1	750501	. RECEPTACLE, Hood catch (57733)	2	
		(ATTACHING PARTS)		
- 2	AD64AH	. RIVET, Solid (29624)	4	
		---*---		
- 3	752002	. HANDLE, Bow (57733)	2	
		(ATTACHING PARTS)		
- 4	AD64AH	. RIVET, Solid (29624)	4	
		---*---		
- 5	38374	. BRACKET, Support	1	
		(ATTACHING PARTS)		
- 6	AD64AH	. RIVET, Solid (29624	2	
		---*---		
- 7	750021	. CATCH, Hood (57733)	2	
		(ATTACHING PARTS)		
- 8	MS35206-279	. SCREW, Machine (96906)	4	
- 9	273801	. NUT, Hex, self locking (24617)	4	
		---*---		
-10	38375	. ROD, Hood support	1	
		(ATTACHING PARTS)		
-11	MS24665-317	. PIN, Cotter (96906)	1	
-12	MS27183-12	. WASHER, Flat (96906)	1	
		---*---		
-13	61350	.. HOOD, Engine compartment	1	
		(ATTACHING PARTS)		
-14	MS35207-264	. SCREW, Machine (96906)	5	
-15	MS21044N3	. NUT, Hex, self locking (96906)	5	
		---*---		
-16	37249-20-1/2	. WEATHERSTRIP (24617)	1	
-17	44412	. PANEL, Hood side,LH	1	
-18	44413	. PANEL, Hood side, RH	1	
		(ATTACHING PARTS)		
-19	17-13-308-11	. SCREW, Panel Fastener (94222)	8	
-20	17-10033-11	. CLIP, "U" (94222)	8	
-21	17-10014-12	. WASHER, Screw retaining (94222)	8	
		---*---		
-22	61495	. FIREWALL	1	
		(ATTACHING PARTS)		
-23	MS90725-60	. SCREW, Cap, hex head (96906)	4	
-24	9411507	. NUT, Hex, self-locking (24617)	4	
		---*---		
-25	40321	. PLATE, Floor, front	1	
-26	34003	. PLATE, Floor, rear	1	
-27	34001	. PLATE, Floor, LH	1	
		(ATTACHING PARTS)		
-28	42610	. SCREW, Hex, self locking	10	
		---*---		

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-49-29	17-13-308-11	. SCREW, Panel fastener (94222)	1	
-30	17-10033-11	. CLIP, "U" (94222)	1	
-31	17-10014-12	. WASHER, Screw retaining (94222)	1	
-32	XX51286K5900	. PLUG, Snap-in (83058)	1	
-33	32570	. PLATE, Warning	1	
-34	33817	. PLATE, Identification (ATTACHING PARTS)	1	
-35	AD66AH	. RIVET, Solid (29624) ---*---	6	
-36	33993	. SUPPORT, Seat (ATTACHING PARTS)	1	
-37	MS90725-60	. SCREW, Cap, hex head (96906)	4	
-38	9411507	. NUT, Hex, self locking (24617) ---*---	4	
-39	34007	. COUNTERWEIGHT, Rear (ATTACHING PARTS)	1	
-40	218099	. BOLT, Carriage (24617)	2	
-41	MS51967-23	. NUT, Hex (96906)	2	
-42	MS35338-51	. WASHER, Lock (96906) ---*---	2	
-43	400-CA	. COUPLER ASSEMBLY (74410) (See figure 6-50 for details)	1	
-44	Not Used			
-45	Not Used			
-46	44498	. PLATE, Cover (ATTACHING PARTS)	1	
-47	MS35207-268	. SCREW, Machine (96906)	2	
-48	MS21044N3	. NUT, Hex, self locking (96906) ---*---	2	
-49	44393	. CHASSIS, Tractor	1	

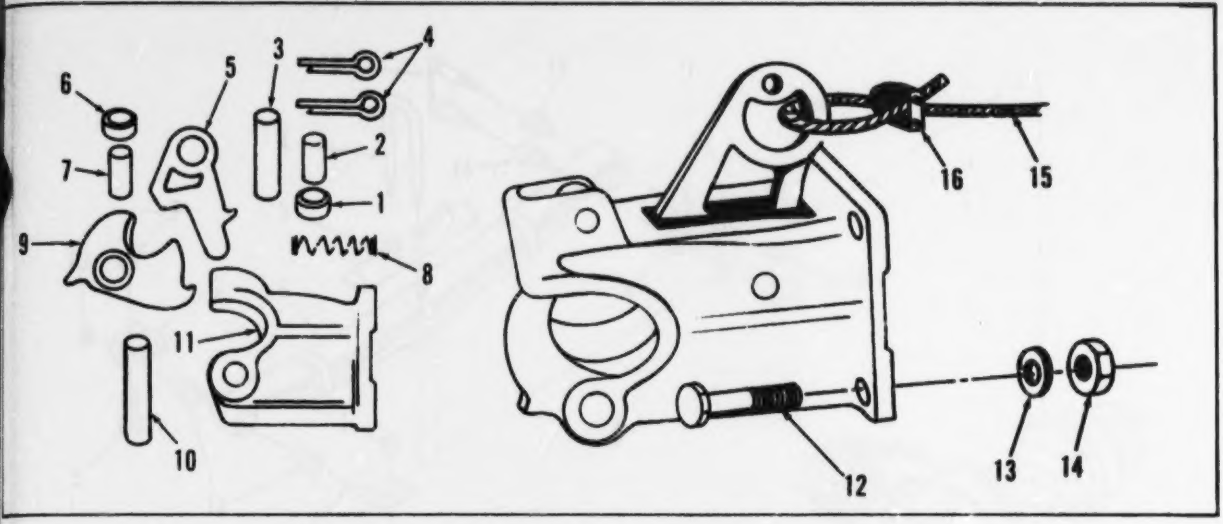

Figure 6-50. Coupler Assembly

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-50-	400-CA	COUPLER ASSEMBLY (74410) . . . . (See figure 6-49 for NHA)	REF	
-1	211	. PULLEY (74410)	1	
-2	212	. PIN, Straight, headless (74410)	1	
-3	404	. PIN, Straight, drilled (74410)	1	
-4	T14	. PIN, Cotter (74410).	2	
-5	401	. LOCK Pintle (74410)	1	
-6	209-A	. ROLLER (74410)	1	
-7	209-1/2-A	. PIN, Straight, headless (74410)	1	
-8	403	. SPRING, Helical, compression (74410)	1	
-9	402	. PINTLE (74410)	1	
-10	409	. PIN, Straight, headless (74410)	1	
-11	N.S.S.	. BASE, Coupler assembly (74410) . . . . . . (ATTACHING PARTS)	1	
-12	428735	. SCREW, Cap, hex head (24617)	4	
-13	103325	. WASHER,'Lock (24617)	4	
-14	103030	. NUT, Plain, hex head (24617) . . . . ---*---	4	
-15	74110	. CABLE, 3/32 x 3116 x 6'LG (77870)	1	
-16	3/16 TYPE MC	. CLAMP, Cable (77870) . . . . ---*---	2	

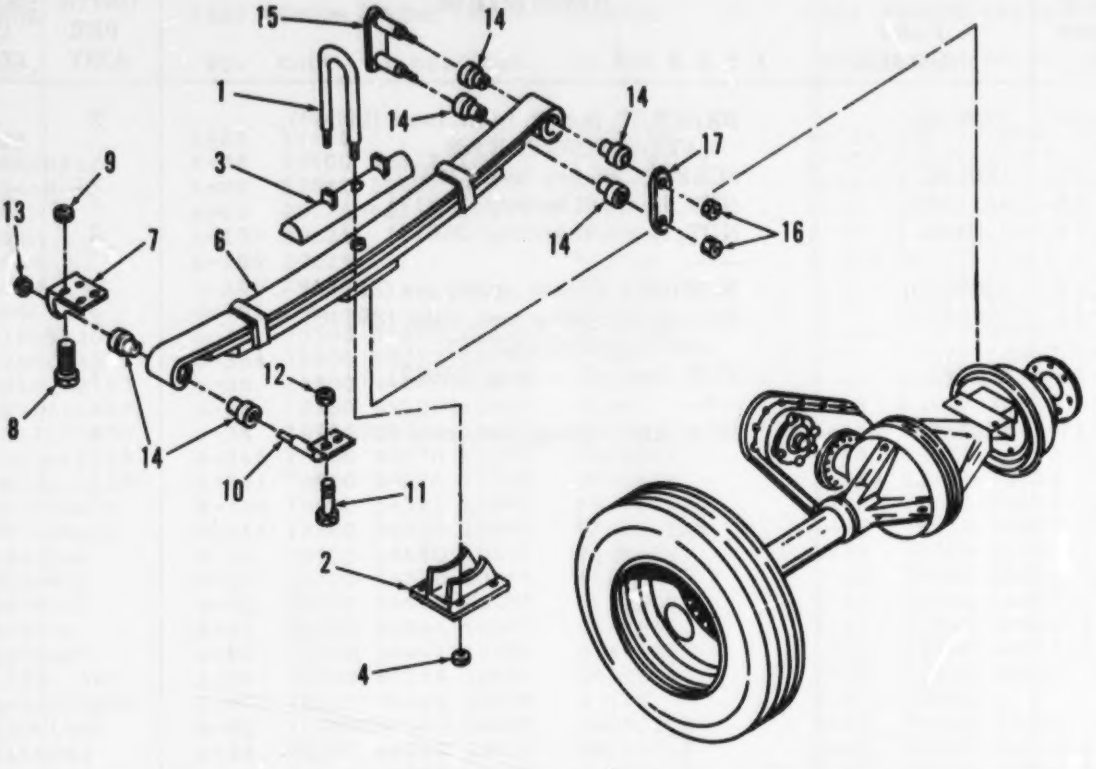

Figure 6-51. Rear Leaf Spring

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-51-	No Number	SPRING, Rear leaf (See figure 6-19 for NHA) . . .	REF	
		(ATTACHING PARTS)		
-1	61274	. U-BOLT, Spring and axle	4	
-2	61275	. PLATE, U-bolt, LH	1	
	61283	. PLATE, U-bolt, RH	1	
-3	61276	. SEAT, Spring	2	
-4	121358	. NUT, Hex, heavy (24617)	8	
-5	Not Used			
		---*---		
-6	745737-1	. SPRING, Leaf, rear (89346)	2	
-7	72177R1	. BRACKET, Spring, front, outer (89346)	2	
		(ATTACHING PARTS)		
-8	180124	. SCREW, Cap, hex head (24617)	4	
-9	9411507	. NUT, Hex, self locking (24617)	4	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6	UNITS PER ASSY	USABLE ON CODE
6-51-10	72698R11	. BRACKET, Spring, front, inner (89346)	2	
		(ATTACHING PARTS)		
-11	180126	. SCREW, Cap, hex head (24617)	4	
-12	9411507	. NUT, Hex, self locking (24617)	4	
-13	272698	. NUT, Hex, self locking (24617)	2	
		—*—		
-14	72686R1	. BUSHING, Rubber, spring eye (89346)	12	
-15	72722R11	. SHACKLE, Spring, rear, outer (89346)	2	
		(ATTACHING PARTS)		
-16	272698	. NUT, Hex, self locking (24617)	4	
		—*—		
-17	72678R1	. SHACKLE, Spring, rear, inner (89346)	2	

SECTION VII
CROSS REFERENCE INDEX

VENDOR PT.NO.	PAGE NO.	VENDOR CODE	PRIME PT.NO.	PRIME CODE
A-100	6-26	79470		
A-1805B262	6-38	78500	44872	10695
AB-2462-A	6-26	23040	30402	10695
AD64AH	6-28	29624	42253	10695
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AD66AH	6-106	29624		
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A1-245Z234	6-36A	78500	39272	10695
A1-3102A2757	6-36	78500	44861	10695
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A1-3111T1450	6-36	78500	39226	10695
A1-3236K1519	6-36A	78500	39270	10695
A1-3236L1520	6-36A	78500	39271	10695
A1-3722X674	6-36A	78500	34321	10695
A1-8722V672	6-36A	78500	34320	10695
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A1805R96	6-38	78500	48564	10695
A1805U307	6-42	78500	34441	10695
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B2A-2474-A	6-26	23040	30403	10695
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CJV0613	6-11	75272	42629	10695
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C7521-12V	6-15	56118	31976	10695
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FC860	6-45	63477	36666	10695
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FD36939	6-36A	63477	34312	10695
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MS90726-32	6-47	96906		
MS90726-37	6-36	96906		
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MS90726-90	6-12	96906		
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P-18	6-38	78500	43279	10695
P112	6-43	78500	41979	10695
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RBL-13Y	6-55	11583	60503	10695
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SFE20	6-17	71400		
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S10534	6-36	72210	34409	10695
S10543	6-23	72210	35993	10695
S10544	6-23	72210	35994	10695

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S268-1	6-38	78500	44870	10695
S2822-1	6-43	78500	48595	10695
S3899A	6-23	72210	35997	10695
S5339	6-23	77210	35996	10695
S5896	6-23	72210	35995	10695
S036	6-23	72210	35998	10695
TA267FHX33	6-38	78500	38369	10695
TS7D	6-9	99203	33301	10695
T113	6-36	78500	19221	10695
T14	6-107	74410	36120	10695
T2002A	6-9	08244	44565	10695
UST15-20	6-12	27964	38572	10695
VF13	6-9	24161	31684	10695
VF30	6-9	24161	44494	10695
WA16	6-38	78500	35965	10695
WA16	6-38	78500	35965	10695
WA16	6-45	78500	35965	10695
WA16	6-42	78500	35965	10695
WA16Z	6-34	78500		
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X654	6-36	78500	34053	10695
Y2	6-28	72741		
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101-307A	6-58	71500		
101-318	6-58	71500		
101-359A	6-58	71500		
101-374	6-58	71500		
101-473	6-58	71500		
101-537	6-58	71500		
101-596	6-58	71500		
101-633	6-59	71500		
10110-R91	6-26	89346	38860	10695
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103324	6-42	24617		
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103340	6-14	24617		
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111606	6-65	74865	48773	10695
11205	6-9	79470	38265	10695
1122532	6-72	74865	36992	10695
114-3100	6-47	76260	35930	10695
115-347	6-59	71500		
115-370	6-58	71500		
1156	6-14	08108	41925	10695
116-13	6-59	71500		
119389	6-14	24617		
1199J166	6-38	78500	18430	10695
119923	6-49	24617		
119923	6-9	24617		
119923	6-17	24617		
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1201	6-21	73740	44832	10695
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121-697	6-59	71500		
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VENDOR PT.NO.	PAGE NO.	VENDOR CODE	PRIME PT.NO.	PRIME CODE
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121900	6-16	24617		
122007	6-53	24617		
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122052	6-32	24617		
122077	6-54	24617		
122119	6-53	24617		
122145	6-49	24617		
122145	6-65	24617		
122168	6-65	24617		
122188	6-55	24617		
122253	6-53	24617		
122253	6-54	24617		
122253	6-49	24617		
122279	6-51	24617		
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1227G943	6-37	78500	61160	10695
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1227M117	6-40	78500	18514	10695
1227N496	6-42	78500	34434	10695
1227R18	6-36	78500	34056	10695
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1229A1925	6-34	78500	39275	10695
1229E1513	6-43	78500	48594	10695
1229G813	6-40	78500	34475	10695
1229H528	6-40	78500	18515	10695
1229U1061	6-43	78500	18505	10695
1229V412	6-43	78500	18489	10695
1229Y1299	6-42	78500	36760	10695
1229Y1507	6-40	78500	49315	10695
1229Z1924	6-34	78500	39274	10695
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1246D134	6-43	78500	41981	10695
1250L38	6-36	78500	34419	10695
1250S123	6-43	78500	34456	10695
1250U125	6-38	78500	34432	10695
126006	6-26	24617	30404	10695
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127960	6-17	24617		
127960	6-49	24617		
131395	6-86	74865	48848	10695
1314476	6-88	74865	34535	10695
1314477	6-88	74865	34537	10695
1314478	6-88	74865	34536	10695
1315158	6-83	74865	45156	10695
1315486	6-65	74865	41069	10695
1316815	6-54	74865	44941	10695

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137185	6-36	24617		
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14256-5	6-18	10695		
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1488901	6-88	74865	34538	10695
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150A-22	6-59	71500		
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1736348	6-72	74865	48724	10695
1736353	6-72	74865	48725	10695
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1829U775	6-42	78500	34436	10695
1838508	6-65	74865	41047	10695
1846C159	6-38	78500	18524	10695
18520	6-34	60038	10148	10695
1854M169	6-38	78500	48561	10695
1855238	6-77	74865	41133	10695
18590	6-34	60038	10147	10695
1859127	6-70	74865	48770	10695
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1936052	6-51	74865	44919	10695
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1942081	6-101	74865	34656	10695
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1942130	6-94	74865	34587	10695
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1942141	6-94	74865	34581	10695
1942150	6-94	74865	34586	10695
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1947617	6-77	74865	41174	10695
1947623	6-77	74865	41124	10695
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1947671	6-55	74865	41082	10695
1947687	6-77	74865	45106	10695
1947762	6-70	74865		
1947797	6-51	10695	45838	10695
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2084387	6-79	74865	46109	10695
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2095114	6-68	74865	48617	10695
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2095117	6-68	74865	48608	10695
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2095875	6-51	74865	48604	10695
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211	6-107	74410	36127	10695
2110H34	6-36	78500	34411	10695
212	6-107	74410	36121	10695
2120514	6-77	74865	41131	10695
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2120764	6-74	74865	48727	10695
2121223	6-70	74865	48766	10695
2121404	6-74	74865	41092	10695
2121578	6-77	74865	46096	10695
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2121580	6-77	74865	45098	10695
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2124737	6-90	74865	34720	10695
2124824	6-97	74865	49730	10695
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2124835	6-99	74865	34643	10695
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2125749	6-54	74865		
2125782	6-53	74865	41062	10695
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218099	6-106	24617		
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2203G6975	6-40	78500	49557	10695
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2203H6976	6-40	78500	49558	10695
2203J6978	6-40	78500	49559	10695
2203K6979	6-40	78500	49560	10695
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2203S6987	6-40	78500	49567	10695
2203T6988	6-40	78500	49568	10695
2203U6989	6-40	78500	49569	10695
2203V6990	6-40	78500	49570	10695
2203W6991	6-40	78500	49571	10695
2203X6992	6-40	78500	49572	10695
2203Y6993	6-40	78500	49573	10695
2203Z6994	6-40	78500	49574	10695
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2204993	6-103	74865	34594	10695
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22688J	6-49	76360	37546	10695
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24DC05	6-22	73740	44834	10695
24DC07	6-22	73740	44849	10695
24DC24	6-21	73740	44831	10695
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31482	6-17	10695		
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3207	6-38	43334	19235	10695
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32109-9	6-18	10695		
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34007	6-106	10695		
34012-9	6-15	10695		
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41664	6-38	10695		
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95000521	6-32	92867	45067	10695
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9652-R	6-14	08064	36797	10695
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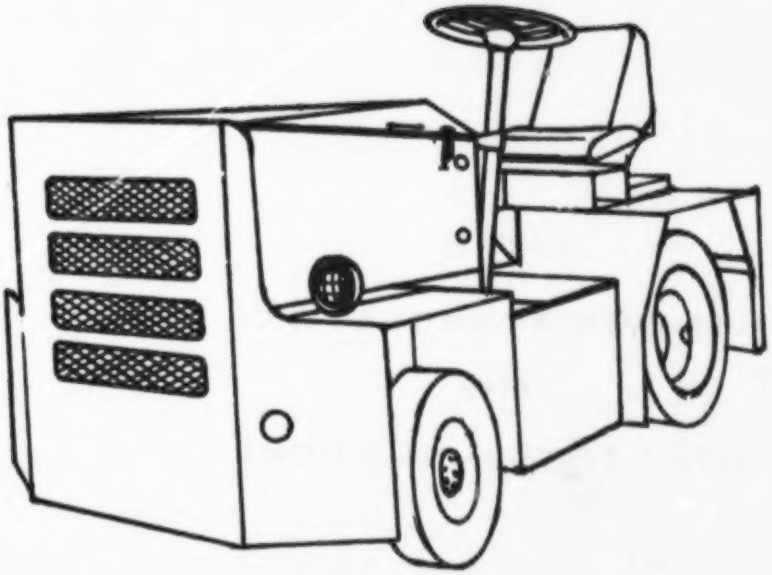
PART II

SUPPLEMENTAL MAINTENANCE AND REPAIR PARTS INSTRUCTIONS



SUPPLEMENTAL OPERATING, MAINTENANCE
AND REPAIR PARTS INSTRUCTIONS
FOR
TRACTOR, WHEELED, WAREHOUSE
GASOLINE, 4,000 LB., DRAWBAR PULL,
PNEUMATIC TIRED, UNITED TRACTOR
MODEL GC-340-4, NSN 3930-01-075-2812

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SECTION I - GENERAL

1.1 PURPOSE: To furnish the user and support personnel additional maintenance and repair parts instructions applicable to the United Model GC-340-4 Wheeled, Warehouse Towing Tractor, 4,000 Lb. (DBP).

1.2 SCOPE: This SOMARPI applies to the Department of the Army Units, Organizations and Activities that use/or support the 4,000 Lb. Towing Tractor Model GC-340-4, Four Wheeled, Pneumatic Tired, Two Rear Wheel Drive, NSN 3930-01-075-2812.

1.3 DESCRIPTION: The 4,000 (DBP) Gasoline Engine Driven, Pneumatic Tired, Warehouse Tractor has a three speed automatic transmission with a torque converter. The tractor is powered by a six cylinder overhead valve (225C1D) Chrysler engine. The tractor is equipped with hydraulic power brakes, provided for both front and rear wheels. The steering system is a completely manual system using a single tie rod, controlling the front wheels. The electrical system is a 12 volt negative ground conventional design with an alternator. All controls and instruments, essential for vehicle operation, are arranged in the operator's compartment and are similar to the controls for a conventional automotive equipment. This tractor is manufactured by the United Tractor Company of Chesterton, Indiana.

1.4 OPERATIONAL CONCEPT: The tractor is intended for use in warehousing operations and for towing trailers & wheeled loads. A coupler is provided at the rear of the vehicle for the attachment of the load. It is designed for high maneuverability and ease of operation in warehousing and the transfer of operations.

1.5 PROCUREMENT STATUS: The Procurement Contract Number is DLA700-78-C-8338 for the Warehouse Tractor Model GC-340-4.

1.6 EQUIPMENT PUBLICATIONS:

1.7 PERSONNEL AND TRAINING:

a. MOS Requirements: Qualitative & Quantitative Personnel Requirements Information (QQPRI) will be disseminated IAW AR 611-201. The following MOS's can operate & maintain the end item:

(1) Operator: 64C (per Change #8, 1 Sep 77) & 76V.

(2) Organizational Maintenance: 63B & 63H.

(3) Direct & General Supply Maintenance: 63B, 63G & 63H.

b. Training:

(1) New Equipment Training Team (NETT): New Equipment Training Teams are available to major field commands. Request for NETT's should be forwarded to: Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MLT, Warren, MI 48090. Training teams should be requested only when trained personnel are not available in the Command to operate and/or maintain the truck.

(2) New Material Introductory Teams (NMIT): Major field commands requiring briefings to Command Staff & Users should forward their requests to Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MLT, Warren, MI 48090. Receiving Commands are responsible for the itinerary of NMIT's.

1.8 LOGISTICS ASSISTANCE (AR 700-4): US Army Tank-Automotive Command's Field Maintenance Technicians stationed at CONUS & OCONUS installations are available to furnish on-site training and/or technical assistance. Assistance can be obtained by contacting the appropriate Logistics Assistance Office (LAO) listed in Appendix B, AR 700-4.

1.9 WARRANTY: The GC-340-4 Warehouse Tractor Warranty Period is 12 months from date of acceptance (See Appendix B for Warranty Guidelines).

1.10 REPORTING: Recommending publication improvements, use DA Form 2028 (Recommended Changes to Publications & Blank Forms) & mail direct to the Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MB, Warren, MI 48090.

SECTION II - MAINTENANCE

2.1 MAINTENANCE CONCEPT:

a. The 4,000 Lb. United Tractor, Model GC-340-4, will not require special or new maintenance considerations. The existing organizations will be utilized for support.

b. Nature & Extent of Maintenance:

(1) Maintenance Allocation Chart (MAC): Maintenance will be performed as necessary by the category indicated in the MAC (Appendix C) to retain and/or restore serviceability. Units may exceed their authorized scope & function in the MAC when approved by the appropriate commander.

(2) Operator Maintenance: Operator maintenance is limited to daily preventive maintenance checks & routine servicing.

(3) Organizational Maintenance: Organizational maintenance consists of scheduled preventive maintenance services, limited removal, minor repairs & adjustments.

(4) Direct Support Maintenance: Direct support maintenance consists of repairs on-site & for return to the user of the end item/assemblies which can be maintained efficiently with a minimum of tools & test equipment.

(5) General Support Maintenance: General support will overhaul and repair for return to stock items designated by the area support commander.

(6) Depot Maintenance: There is no scheduled depot maintenance on the 4,000 Lb. (DBP) Warehouse Tractor, United Model GC-340-4.

c. Maintenance Expenditure Limits: The maintenance expenditure limits is based on the life expectancy of 11 years. Limits on repair are based upon 50% replacement cost through the life expectancy of the item (IAW TB 43-0002-24).

2.2 RELIABILITY & MAINTAINABILITY: Reliability & Maintainability will be assessed through the field evaluation of current users. Specific numerical RAM requirements or objectives are not established.

2.3 MODIFICATIONS: Modifications will be accomplished by the end item manufacturer after TARCOM approval.

2.4 EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR): Equipment Improvement Recommendations will be submitted IAW TM 38-750.

2.5 SHIPMENT AND STORAGE:

a. Shipment & Storage: Refer to TB 740-94-2 for procedures covering preservation of equipment for shipment. General procedures for shipment are found in FM 55-15, with more specific information in TM 55-2200-001-12 for rail and TM 55-450 series for air transport.

b. Administrative Storage: Refer to TM 740-90-1 for instructions covering administrative storage of equipment.

c. Weight Classification: The weight classification of the end item is 5,250 Lbs.

2.6 DESTRUCTION TO DENY ENEMY USE: Refer to TM 750-244-3 for instructions governing destruction of equipment to prevent enemy use.

2.7 BASIC ISSUE ITEMS LIST (BIIL): See Appendix D.

2.8 SPECIAL TOOLS AND EQUIPMENT: Special tools and equipment are not required for the Warehouse Tractor, Model GC-340-4.

2.9 MAINTENANCE AND OPERATING SUPPLY LIST: See Appendix E for a list of maintenance and operating supplies required for initial operation.

2.10 MAINTENANCE FORMS AND RECORDS: Operational, maintenance and historical records will be maintained as required by the current TM 38-750.

SECTION III - REPAIR PARTS SUPPLY

3.1 GENERAL:

a. The basic policies and procedures in AR 710-2 and AR 725-50 are generally applicable to repair parts management for Material Handling Equipment (MHE) items.

b. Manufacturer's part manuals are furnished with MHE items at initial fielding. Department of the Army Repair Parts and Special Tool List (RPSTL) will be available approximately two years after fielding.

c. National Stock Numbers (NSNs) are initially assigned only to PLL/ASL parts and major assemblies; i.e., engines, transmissions, etc. Additional NSNs are assigned by the supply support activities as demands warrant.

d. Automated Processing (AUTODIN) of Federal Supply Code Manufacturer (FSCM) part number requisitions, without edit for matching NSNs, is authorized.

e. Proper use of Direct Support System (DSS) Project Codes is essential. Weapon System Designator Codes on part requisitions are not required.

f. Repair parts are available from commercial sources for CONUS units and may be purchased locally IAW AR 710-2 and AR 735-110.

g. Initial Prescribed Load List (PLL) and Authorized Stockage List (ASL) will be distributed by the Tank-Automotive Command (TARCOM), DRSTA-FHM.

3.2 PRESCRIBED LOAD LIST (PLL): The PLL, distributed by TARCOM, is an estimated 15 days supply recommended for initial stockage at organizational maintenance. Management of PLL items will be governed by the provisions of AR 710-2 and local command procedures. A prepared list of PLL parts will be provided to OCONUS units before shipment of the end item. Selection of PLL parts for shipment to OCONUS units is based upon the receiving command's recommendation after their review of the TARCOM prepared list. Organizations and activities in CONUS will establish PLL stocks through normal requisitioning process. NOTE: Local purchase of repair parts is authorized IAW AR 710-2 and AR 735-110.

3.3 AUTHORIZED STOCKAGE LIST (ASL): The ASL, distributed by TARCOM, is an estimated 45 days supply of repair parts for support units and activities. An initial list of ASL parts will be provided to designated support units (OCONUS) before shipment of the end items. The parts shipped will be selected according to the recommendations of the receiving commands. Receiving commands will make their recommendations after review of the initial list distributed by TARCOM. Support units and activities in CONUS will establish ASL stock through the normal requisitioning process. NOTE: Local purchase of repair parts is authorized IAW AR 710-2 and AR 735-110.

3.4 REQUISITIONING REPAIR PARTS (MILSTRIP):

a. All MILSTRIP requisitions (DD Form 1348 series) prepared for repair parts support of MHE items will include the use of certain distribution and project codes.

b. Distribution Codes: The distribution code consists of a two part field. The first part (card column 54) designates the control activity that should receive supply and shipping status of all requisitions. The second part (card columns 55-56) identifies the end item by the use of a Weapons System Designator Code.

(1) CONUS customers will use code "F" in card column 54. OCONUS customers will use the appropriate code from Appendix P, paragraph P-3, AR 725-50.

(2) The Weapons System Designator Code for the United Tractor Truck is not applicable. Card Columns 55 & 56 will be left blank and all requisitions for parts to support the designated end item.

c. Project Codes: The applicable Direct Support System (DSS) Project Code (Figure 2-5, FM 38-725) will be used in card columns 57-59 on all NSN part requisitions for both CONUS and OCONUS customers. The applicable DSS Project Code will also be used by CONUS customers on non-NSN (Manufacturer's part number) part requisitions. OCONUS customers requisitioning non-NSN parts shall use the CHE/MHE project code JZM in card columns 57-59.

3.5 SUBMITTING REQUISITIONS: Requisitions for NSN parts will be forwarded through the Defense Automated Addressing System (DAAS) to the Managing Supply Support Activity. Requisitions for non-NSN parts will be forwarded through DAAS to the Defense Construction

Supply Center (DCSC). NOTE: When the manufacturer's part number and federal supply code for manufacturer (FSCM) exceed the space in card columns 8 through 22 of A02/A0B requisitions, prepare an A05/A0E requisition (DD Form 1348-6) and mail it to: Commander, Defense Construction Supply Center, ATTN: DCSC-OSR, Columbus, Ohio 43215.

APPENDIX A

(Not applicable)

APPENDIX B

Warranty Guidelines

1. The warranty period is 12 months from the date of acceptance. Repair parts support is based on 1500 hours of operation defined as one year. Failure of defective components, parts or assemblies; covered by the manufacturer's warranty; will be processed by the using unit under the warranty claim actions published in TM 38-750, paragraph 3-7.4.2.
2. The United Tractor Company is required to extend to the Government full benefits of the warranty of major assemblies or components used in the end item.
3. The warranty is described in Section I of the Commercial Manual. Copies of the manual are overpacked with each vehicle. When a warranty circumstance arises, contact the United Tractor Company (219/926-1186) informing them of the model, serial number, contract number pertaining to the unit and a summary as to the nature of the problem.
4. If the United Tractor Company is not available, CONUS units may notify the National Maintenance Point (NMP), AUTOVON 273-3363/3389/3395 and OCONUS units will follow the warranty reporting procedures in TM 38-750; including information required in paragraph 3 above.
5. All warranty claims, whether they are settled locally with the manufacturer representative or processed through normal Army

Maintenance Support Channels, must be reported to: Commander US Army Tank-Automotive Command, ATTN: DRSTA-MVM, Warren, MI 48090.

APPENDIX C

Maintenance Allocation Chart
For
United Tractor, Warehouse, Gasoline
4,000 Lb., Drawbar Pull, Pneumatic Tired

Section I - Introduction

1. General: This Maintenance Allocation Chart (MAC) designates responsibility for performance of maintenance functions to specific maintenance categories.

2. Maintenance Functions: Maintenance functions are as follows:

   a. Inspect: To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

   b. Test: To verify serviceability and detect beginning failures by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

   c. Service: Operations required periodically to keep an item in proper operating condition; i.e., to clean (decontaminate), to preserve, to drain, to paint or to replenish fuel, lubricants, hydraulic fluids or compressed air supplies.

   d. Adjust: To maintain, within prescribed limits, by bringing into proper or exact position or by setting the operating characteristics to specified parameters.

   e. Align: To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate: To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect & adjust discrepancy in the accuracy of the instrument being compared.

g. Install: The act of emplacing, seating or fixing into position an item, part or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace: The act of substituting a serviceable like type part, subassembly or module (component or assembly) for an unserviceable counterpart.

i. Repair: The application of maintenance services or other maintenance actions to restore serviceability to an item by correcting specific damage, fault, malfunction or failure in a part, subassembly, module (component or assembly), end item or system.

j. Overhaul: That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild: Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurement (hours/miles, etc.) considered in classifying Army equipment/components.

3. Column Entries: Columns used in the MAC are explained below:

a. Column 1 - Group Number: Column One (1) lists group numbers from TB 750-93-1, the purpose of which is to identify components, assemblies, subassemblies and modules with their next higher assemblies.

b. Column 2 - Components/Assemblies: Column Two (2) contains the noun names of components, assemblies, subassemblies and modules for which maintenance is authorized.

c. Column 3 - Maintenance Functions: Column Three (3) lists the functions to be performed on the item listed in Column 2.

d. Column 4 - Maintenance Category: Column Four (4) specifies, by the listing of a "work time" figure in the appropriate sub column(s), the category of maintenance authorized to perform the function listed in Column 3. This numeric figure represents the active time required to perform that maintenance function at the indicated category of maintenance. The number of man hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC.

e. Column 5 - Tools and Equipment: Column Five (5) specifies by code, those common tool sets (not individual tools) and special tools (if applicable), test & support equipment required to perform the designated function.

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
01	ENGINE								
0100	Engine	Test		1.0				1	A
		Service	0.1						
		Adjust			2.5				
		Replace			12				
		Repair			*	*			
		Overhaul				85.0			
	Engine Mount	Replace			2.0				
0101	Block, Engine	Repair				40.0		1	
	Cylinder, Head	Replace			10.0				
		Repair			12.0				
0102	Damper, Vibration	Replace			4.5			1	
	Seals, Main	Replace			7.2				
	Bearings, Crankshaft	Replace				3.5			
0103	Flywheel	Replace			6.9			1	
		Repair			1.0				
	Flywheel Housing	Replace				9.5			
0104	Piston and Connecting Rod	Replace				24.0		1	
		Repair				1.0			
	Bearing, Connecting Rod	Replace				3.0			
	Rings	Replace				7.2			
0105	Camshaft and Bearing	Replace				8.0		1	
	Valves and Tappets	Adjust			1.5				
		Replace			4.0				
	Timing Gears	Replace			3.5				

*The subcolumns are as follows:
C—operator/crew
O—organizational
F—direct support
H—general support
D—depot
**Worktimes are included in DMWR

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
	Arm Rocker	Adjust		1.0				1	B
		Replace			2.5				
0106	Oil Pump	Replace			3.5			1	
		Repair				1.0			
	Filter, Oil	Service		0.5					
		Replace		1.0					
	Lines, External	Replace		1.0					
	Valve, Breather	Service		0.2					
	Level Gage	Replace		0.1					
	Oil Pan	Replace		2.0					
0108	Manifolds	Replace			2.0			1	
03	FUEL SYSTEM								
0302	Pump Assembly, Fuel	Test		0.5				1	
		Replace		1.5					
		Repair			1.0				
0304	Air Cleaner Assembly	Service	0.1						
		Replace		.5					
		Repair			1.0				
0306	Tanks, Fuel	Service	1.0					1	
		Replace		3.0					
		Repair			*				
	Lines & Fittings, Fuel	Replace		1.0					
0308	Governor	Adjust			1.0				
		Replace			6.0				
		Repair			2.0				

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Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0309	Fuel Filter	Service Replace	0.1	 0.3				1	
0312	Accelerator & Throttle	Adjust Replace Repair		0.3 0.5 0.5				1	
04	EXHAUST SYSTEM								
0401	Exhaust Pipes	Replace		1.5				1	
	Muffler	Replace		2.0					
05	COOLING SYSTEM								
0501	Radiator	Test Service Replace Repair	 0.2	0.1	 8.0 4.0			1	
0503	Thermostat	Test Replace		0.2 1.5				1	
	Hoses	Replace		0.5					
0504	Pump, Water	Replace Repair Overhaul		2.5	 2.0	 3.0		1	
	Water Seal	Replace		2.0					
0505	Fan	Replace Repair		1.0	 1.5			1	
	Belts, Fan Drive	Adjust Replace		0.2 1.7					
06	ELECTRICAL SYSTEM								
0601	Alternator	Test Replace Repair		1.0 1.3	 2.0			1	

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D—depot
****Worktimes are included in DMWR**

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
	Belts, Drive	Adjust Replace		0.3 1.4					
0603	Starter	Test Replace Repair		1.4 2.0		 3.0		1	
	Cable	Replace		1.5					
	Solenoid, Relay	Test Replace		0.4 0.3					
0607	Instrument Panel	Replace Repair		1.5	 3.0			1	
	Circuit Breaker	Test Replace		0.5 2.0					
0608	Switches	Test Replace		0.4 0.5				1	
0609	Lights, Head	Adjust Replace Repair		0.2 0.4 1.0				1	
	Lights, Tail and Park	Repair Replace		0.4 0.3					
0610	Unit, Sending	Replace		0.5				1	
0611	Switch and Relay	Replace			1.0			1	
	Horn	Test Replace Repair		0.2 0.5 0.5					
0612	Battery	Test Service Replace	 0.5	0.6 0.4				1	

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Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
	Battery, Hold Down Rack	Replace		1.0					
		Repair		1.0					
	Cables, Battery	Replace		0.4					
		Repair		0.8					
0613	Wiring	Test		2.5				1	
		Replace			10.0				
		Repair		2.0					
07	TRANSMISSION								
0708	Torque Converter	Repair			6.0			1	
		Replace			10.0				
		Overhaul				8.0			
0710	Transmission	Test			0.5			1	
		Service	0.2						
		Replace			6.5				
		Repair			8.0				
		Overhaul				20.0			
	Shift Linkage	Adjust		1.0					
		Replace		2.0					
		Repair		1.0					
0721	Filter	Replace		0.5				1	
09	PROPELLER SHAFTS							1	
	Shaft, Assembly and U-joints	Service		0.2					
		Replace		1.0					
10	FRONT AXLE								
1000	Axle, Assembly	Service		1.0				1	
		Replace			6.0				
		Repair			8.0				

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**Worktimes are included in DMWR

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	 O	 F	 H	 D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
1004	Steering Knuckle	Service		0.1				1	
		Replace		0.7					
11	REAR AXLE								
1100	Axle, Assembly	Service		1.0				1	
		Replace			6.0				
		Repair			8.0				
		Overhaul				40.0			
	Shaft, Axle	Replace			8.0				
1102	Differential	Service		1.0					
		Replace			9.8				
		Repair				9.8			
12	BRAKES								
1202	Brake Assembly, Foundation	Adjust		0.5				1	
		Replace			3.0				
		Repair			4.0				
1206	Linkage, Mechanical	Adjust		1.0				1	
		Replace			3.0				
		Repair			2.0				
13	WHEELS								
1311	Hub, Assembly	Service		1.0				1	
		Adjust		0.5					
		Replace		1.0					
	Drum	Replace		2.0					
		Repair			3.0				
	Bearings and Seals	Replace		1.6					
1313	Tires	Service	0.3					1	
		Replace		2.1					
		Repair		1.3					

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D—depot
**Worktimes are included in DMWR

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
14	STEERING								
1401	Wheel, Steering	Replace		0.5					
	Column, Steering	Replace			4.0				
		Repair			3.5				
	Idler Arm	Replace			2.5				
	Tie Rod	Service	0.1						
		Align		0.3					
		Replace			1.5				
	Gear, Steering	Adjust		0.2				1	
		Service		0.3					
		Replace			3.2				
		Repair				7.0			
.15	FRAME AND TOWING ATTACHMENTS							1	
1501	Frame	Repair		*	*				
16	SPRINGS								
1601	Spring and Spring Seats	Service		0.2				1	
		Replace			4.0				
		Repair			2.0				
18	BODY								
1801	Step	Replace			0.5				
		Repair			*				
	Panels and Engine Shroud	Replace		0.5					
		Repair			0.3				
1802	Fenders	Replace			1.5			1	
		Repair		*	*				
1806	Seats	Replace		0.5				1	
		Repair			1.5				

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D—depot

**Worktimes are included in DMWR

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY*					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
22	ACCESSORY ITEMS								
2210	Plates, Data and Instructions	Replace		0.5				1	
47	GAGES								
4702	Gages, Pressure	Test		0.5				1	
		Replace		0.5					
4703	Hourmeter	Replace		1.0				1	

*The subcolumns are as follows:
C—operator/crew
O—organizational
F—direct support
H—general support
D—depot

**Worktimes are included in DMWR

MAINTENANCE ALLOCATION CHART FOR

4,000 LB. (DBP) WAREHOUSE TRACTOR
UNITED MODEL GC-340-4

(MD SOP 700-5)

SECTION III - TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1.		Unless otherwise noted, all maintenance functions can be accomplished with the tools contained in the following common tool sets.		
	F,H	Shop Equip Contact Maint Truck Mounted	4940-00-294-9518	LIN T10138
	F,H	Shop Equip Gen Purp Repair Semitrlr MTD	4940-00-287-4894	LIN T10549
	F,H	Shop Equip Org Repair Light Truck MTD	4940-00-294-9516	LIN T13152
	F,H	Tool Kit Automotive Fuel & Elec Sys Repair	4910-00-754-0655	LIN W32456
	O,F,H	Tool Kit Auto Maint: ORG Maint Common #1	4910-00-754-0654	LIN W32593
	O,F,H	Tool Kit Auto Maint: ORG Maint Common #2	4910-00-754-0650	LIN W32730
	O,F,H	Tool Kit Auto Mech: Light Weight	5180-00-177-7033	LIN W33004
	F,H	Tool Kit Master Mech: Equip Maint & Repair	5180-00-699-5273	LIN W45060
	F,H	Wrench Torque: 3/4" Drive 100-500 lb Cap	5120-00-542-5577	LIN Y84966
	F,H	Shop Eqp Fuel & Elec Sys Engine	4910-00-754-0714	T30414
	F,H	Shop Set Fuel & Elec Sys Supp No. 2	4910-00-390-7775	T30688
	F,H	Shop Eqp Auto Maint & Rpr Org Supp No. 1 Less Power	4910-00-754-0653	W32867

PREVIOUS EDITIONS OF THIS FORM MAY BE USED

MAINTENANCE ALLOCATION CHART FOR

4,000 LB. (DBP) WAREHOUSE TRACTOR
UNITED MODEL GC-340-4

(MD SOP 700-5)

SECTION III - TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
	F,H	Shop Eqp Machine Shop	3740-00-754-0708	T15644
	F,H	Tool Kit Machinist	5280-00-511-1950	W44512
	F,H	Shop Eqp Welding	3740-00-357-7268	T16714
	F,H	Tool Kit Body and Fender Repair	5180-00-754-0643	W33680

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

MAINTENANCE FORMS AND RECORDS

Every mission begins and ends with the paperwork. There isn't much of it, but you have to keep it up. The forms and records you fill out have several uses; they are a permanent record of the services, repairs and modifications made on your vehicle. They are reports to organizational maintenance and to your Commander. They are a checklist for you when you want to know what is wrong with the vehicle after its last use and whether those faults have been fixed. For the information you need on forms and records, see TM 38-750.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

a. Do your before (B) PREVENTIVE MAINTENANCE just before you operate the vehicle. Pay attention to the CAUTIONS AND WARNINGS.

b. DURING checks and services (D) of PREVENTIVE MAINTENANCE will be performed while the equipment and/or its component systems are in operation.

c. Do your after (A) PREVENTIVE MAINTENANCE right after operating the vehicle. Pay attention to the CAUTIONS and WARNINGS.

d. Do your weekly (W) PREVENTIVE MAINTENANCE weekly.

e. Do your monthly (M) PREVENTIVE MAINTENANCE once a month.

f. If something doesn't work, troubleshoot it with the instructions in this manual or notify your supervisor.

g. Always do your PREVENTIVE MAINTENANCE in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

h. If anything looks wrong and you can't fix it, write it on your DA Form 2404. If you find something seriously wrong, report it to organizational maintenance RIGHT NOW.

i. When you do your PREVENTIVE MAINTENANCE, take along the tools you need to make all the checks. You always need a rag or two.

WARNING

> Dry cleaning solvent, used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 138°F.

(1) Keep it clean: Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (SD-2) on all metal surfaces. Use soap and water when you clean rubber or plastic material.

(2) Bolts, nuts and screws: Check them all for obvious looseness, missing, bent or broken condition. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around bolt heads. If you find one you think is loose, tighten it, or report it to organizational maintenance if you can't tighten it.

(3) Welds: Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to organizational maintenance.

(4) Electric wires and connectors: Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.

(5) Hoses and fluid lines: Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, of course. But a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to organizational maintenance.

j. It is necessary for you to know how fluid leakage affects the status of your vehicle. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your vehicle. Learn, then be familiar with them and REMEMBER-WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR!

Leakage Definitions for Crew/Operator PMCS

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

EQUIPMENT OPERATION IS ALLOWABLE WITH MINOR LEAKAGES (CLASS I OR II). OF COURSE, CONSIDERATION MUST BE GIVEN TO THE FLUID CAPACITY IN THE ITEM/SYSTEM BEING CHECKED/INSPECTED. WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR.

Item No.	Interval					ITEM TO BE INSPECTED Procedure: Check For And Have Repaired, Filled or Adjusted As Needed		Equipment is Not Ready/ Available If:
	B	D	A	W	M			
						NOTE		
						Item number column shall be used as a source of item numbers for the "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMC.		
						NOTE		
						Within designated interval, these checks are to be performed in the order listed.		
						NOTE		
						Perform weekly as well as before PMCS's if:		
						a. You are the assigned driver, but have not operated the vehicle since the last weekly.		
						b. You are operating the vehicle for the first time.		
						Make the following walk-around checks:		
						NOTE		
						After a long duration of a mission, make sure all tires are checked.		
1						TIRES		
						Check tires for correct air pressure:		
				●		Front axle tires	45 PSI	
				●		Rear axle tires	45 PSI	

Item No.	Interval					ITEM TO BE INSPECTED Procedure: Check For And Have Repaired, Filled or Adjusted As Needed	Equipment is Not Ready Available If:
	B	D	A	W	M		
2						EXTERIOR OF VEHICLE	
				●		a. Check for body, undercarriage and components damage.	
	●					b. Check tires for cuts, gouges or cracks.	Tires have cuts, gouges or cracks which would result in tire failure. One or more tires are unserviceable.
	●					c. Look for evidence of fluid leakage (oil, fuel, brake fluid and water).	Class III leakage evident. No fuel leakage allowed.
						d. Check condition of:	
		●				(1) Windshield and windows.	
		●				(2) Windshield wiper arms and blades.	
		●				(3) Mirrors.	
3						FUEL TANKS	
					●	Inspect fuel tanks and lead-off lines for leakage and damage.	Any leaks are detected.
4						EXHAUST SYSTEM	
		●				Visually inspect the muffler, shield and exhaust pipes for damage, and security of hardware and audible leakage.	

Item No.	Interval B	 D	 A	 W	 M	ITEM TO BE INSPECTED Procedure: Check For And Have Repaired, Filled or Adjusted As Needed	Equipment is Not Ready Available If:
5						BATTERIES	
						WARNING	
						Do not smoke or allow any flame in the vicinity while checking or filling the battery. The battery generates hydrogen; a highly explosive gas.	
				●		Check terminals for corrosion or obvious defects, such as cracked casing and battery terminal posts. Add distilled water to 3/8" above the plates if required, reference TM 10-6140-200-14.	Battery cracked or discharged.
					●	Check battery compartment for broken latches, cracks in the cover and insure mounting hardware/bolts are tight. Clean with baking soda solution.	
6						HUBS AND DRUMS	
						WARNING	
			●			After operation, cautiously feel brake drums and hubs for excessive heat.	
						Overheated brake drums indicates improperly adjusted, defective or dry wheel bearings or dragging brakes.	
7						SEATS	
					●	a. Check operator and crew seats for loose mounting and damage.	
		●				b. Make sure operator's seat is properly adjusted.	

Item No.	Interval					ITEM TO BE INSPECTED **Procedure:** Check For And Have Repaired, Filled or Adjusted As Needed	Equipment is Not Ready Available If:
	B	D	A	W	M		
8						FIRE EXTINGUISHER (If Equipped)	
	●					Check for damaged fire extinguisher. Check gage for proper pressure (150 PSI). Make sure the mounting is secure.	Fire extinguisher damaged does not indicate proper pressure.
9						INSTRUMENT GAGES, CONTROLS AND INDICATORS	
		●				Check to make sure gages, controls and indicators are operating properly and registering the proper readings.	Engine oil pressure gage, temperature gage or transmission gage inoperative.
		●				a. Oil pressure gage indicates normal operating range (15 to 80 psi).	
		●				b. Engine water temperature gage indicates normal operation temperature (175° to 200°F).	
		●				c. Transmission operating temperature (200° to 230°F).	Transmission overheating (270°F).
		●				d. Check emergency flasher control and all lights for operation.	

Item No.	Interval					ITEM TO BE INSPECTED Procedure: Check For And Have Repaired, Filled or Adjusted As Needed	Equipment is Not Ready Available If:
	B	D	A	W	M		
10					●	'TRANSMISSION When the transmission has reached normal operating temperature range (200° to 230°F), shift through the positions on the range selector and return the lever to the N position. (Make sure the truck is on level ground). Apply the parking brake, leave the engine running at idle speed, and check the transmission fluid level on the dipstick (safe operating level is between FULL and ADD marks on dipstick). If level is low, add DEXTRON rated only transmission fluid up to the FULL mark on the dipstick (be careful not to overfill the transmission). If fluid level is above FULL mark on dipstick, notify organizational maintenance. CAUTION: While driving, check transmission operation through all range selector positions.	Class III leakage evident Shifts roughly, slips, vibrates; is unusually noisy or the hydraulic retarder is not properly operating.
11		●				STEERING OPERATION Turn the steering wheel to the right and left checking for any unusual noise, binding or difficulty in steering.	Steering binds.
12						BRAKES	Service or parking brakes do not operate properly.
		●				a. Check for chatter, noise and side pull.	
		●				b. Make sure that brakes are operating properly.	
	●					c. Check for proper operation of the parking brakes.	

Item No.	Interval					ITEM TO BE INSPECTED Procedure: Check For And Have Repaired, Filled or Adjusted As Needed	Equipment is Not Ready Available If:
	B	D	A	W	M		
13				●		BELTS Check for cracked, worn and frayed belts.	
14		●				ENGINE OIL After engine has warmed up, stop the engine and check for proper oil level on the dipstick (should be between L (LOW) and F (FULL) marks.	Class 111 leakage is noted.
15				●		ENGINE COOLANT WARNING Do not remove radiator cap when engine is very hot. Check coolant level at the radiator filler neck (level should be approximately one inch from bottom of filler neck). If level is low, add a mixture of ethylene glycol anti-freeze and clean water to bring coolant to proper level (check with organizational maintenance for the proper mixture.	
16				●		RADIATOR Check for leaks, clogged or damaged fins and loose or damaged hoses.	

APPENDIX D

BIIL

SMR CODE	NATIONAL STOCK NUMBER	DESCRIPTION REF NO. AND MFG CODE	DESCRIPTION USABLE ON CODE	UNIT OF MEASURE	QTY AUTH
		NOTE: The following items are overpacked with the 4,000 (DBP) Warehouse Tractor, United Model GC-340-4			
	7520-00-559-9618	Case, Cotton Duck: MIL-B-11743		ea	1
	7530-01-065-0166	Equipment Record Folder		ea	1
		NOTE: The following items are authorized but not issued with the end item.			
	4210-00-889-2221	Extinguisher, Fire Dry Chemical		ea	1

APPENDIX E

Lubricants	Capacity	32°F And Above	0°F to 32°F	0°F to -65°F	
OE-Oil, Engine		OE-30	OE-10	OE-5	
Engine Crankcase (See Note 1)	6 Qts				
Oil Can Points		OE/HDO 10	OE/HDO 10	OE/HDO 5	
Transmission	6 Qts	DEXRON	DEXRON	DEXRON	
GO-Lubricating Oil, Gear		GO85/W140	GO80W/90		
GAA - Grease, Auto & Artillery		All Temperatures			

1. Engine Crankcase. Add one quart (.947 liters) when the oil filter is replaced.

2. For operation of equipment in protracted cold temperatures below 32°F, remove prescribed lubricants in the key for temperatures above 32°F; relubricate with lubricants below 32°F.

3. Oil Can Points. Every 50 hours lubricate brake treadle hinge and roller.

4. Front Wheel Bearings. The front wheel bearings should be inspected and repacked annually or every 1200 hours of operation.

5. Rear Wheel Bearings. Once a year or every 1200 hours of operation, check and relubricate rear wheel bearings (See special instructions in Maintenance Manual, page 4-11, paragraph 4-22).

6. Lubricants. The following is a list of lubricants with military symbols & applicable specification numbers - OE/HDO MIL-L-2104C, GO MIL-L-2105B, OHA MIL-H-5606C & GAA MIL-G-10924.

NOMENCLATURE: Tractor, Wheeled, Warehouse, 4,000 Lb (DBP) GED	MAKE: United Tractor Company	MODEL: GC-340-4

MFR PART NO:	NSN: 3930-01-075-2812	SERIAL NO. RANGE:	DATE:

COMPONENT APPLICATION	MFR PART NO. OR NAT'L STOCK NO.	DESCRIPTION	QTY REQ F/INITIAL OPN	QTY REQ F/8 HRS OPN	NOTES
Engine	9150-00-188-9858	OE/HDO-30 (5 Gal)	None	As Req	See Attached Sheet
	9150-00-188-9859	OE/HDO-30 (55 Gal)			
	9150-00-186-6668	OE/HDO-10 (5 Gal)			
	9150-00-189-6728	OE/HDO-10 (55 Gal)			
	9150-00-402-2372	OE/HDO-5 (5 Gal)			
	9150-00-491-7197	OE/HDO-5 (55 Gal)			
Radiator	6850-00-243-1992	Anti-freeze, Ethylene Glycol, Inhibited			When using ethylene glycol (permanent type) anti-freeze, the solution must contain a minimum of 40% water.
Transmission	9150-00-698-2382	Dexron Automatic Trans F (1 Qt)	None		
	9150-00-657-4959	Dexron Automatic Trans F (5 Gal)			
Lubrication Fittings	9150-00-190-0907	GAA (35 lb Can)	None	As Req	
Differential	9150-01-035-5393	GO80W/90 (5 Gal)	None		
	9150-01-035-5395	GO85W/140 (5 Gal)			

APPENDIX F

PRESCRIBED LOAD LIST/AUTHORIZED STOCKAGE LIST

ITEM: Tractor, Warehouse, 4,000 Lb. (DBP), Gas Powered, Model GC-340-4

CONTRACT NO.: DLA-700-78-C-8338

CONTRACTOR: United Tractor Company, Chesterton, Indiana

QUANTITY: 256 each

PREVIOUS PROCUREMENTS:

Contractor	Quantity	Year
United	718	FY71
Minn-Moline	222	FY60
Clark	234	FY60
United	189	FY64
Northwestern	169	FY67
Clark	362	FY64
Motec	222	FY63

SMR CODE	NSN	PART NUMBER	FSCM	PART DESCRIPTION	U.M.	PLL 1-5	ASL 1-5	UNIT PRICE
PAOZZ	2920-00-233-7693	RBL-13Y	11583	Plug, Spark	Ea	0	1	.45
PAOZZ	2940-00-586-4792	3549957	12204	Filter, Oil	Ea	4	10	.95
PAOZZ	3030-00-826-7650	MS-51065-39	96906	Belt, W/Pump & Idl	Ea	1	2	.94
PAOZZ	3030-00-936-7173	3671074	93334	Belt, Fan, Altnt.	Ea	1	2	.96
PAOZZ	6240-00-295-1184	1034	08108	Bulb, Stop & Tail	Ea	1	2	.18
PAOZZ	6240-00-012-7934	57	08108	Bulb, Shift Bezel	Ea	0	1	.08
PAOZZ	2910-00-845-6770	G2	73370	Element F/FLT	Ea	1	1	.57
PAOZZ	6240-00-836-2079	35046	10695	Lamp, S/Beam	Ea	1	2	1.51
PAOZZ	6240-00-924-7526	1156	08108	Bulb, Pintle	Ea	1	1	.15

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25A, Organizational maintenance requirements for Warehouse Equipment.

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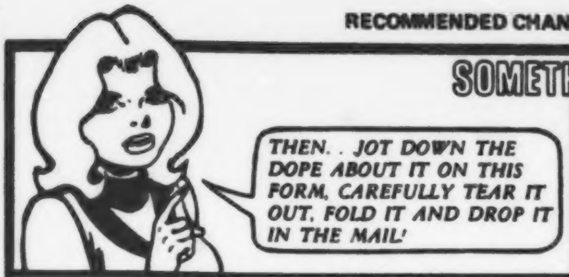
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Your mailing address

DATE SENT
Date you filled out this form

PUBLICATION NUMBER TM 10-3930-642-14&P	PUBLICATION DATE	PUBLICATION TITLE Tractor, Whd, Warehouse Model GC340-4

BE EXACT. . . PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
75		183		Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.
110		57		Figure 57, item 3 has the wrong NSN. The NSN shown here is not listed in the AMDF or the MCRL. Please give us the correct NSN and P/N.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
John Smith, SP4
798-3321

SIGN HERE:
SP4 John Smith

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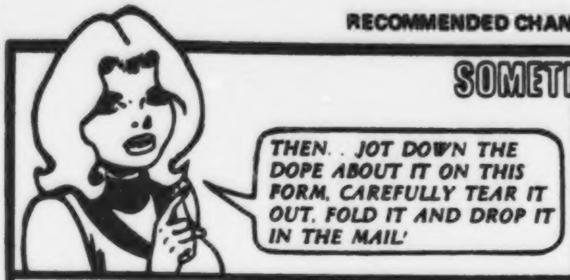
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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

TEMPERATURE

$5/9\,(^0F - 32) = {}^0C$
212^0 Fahrenheit is equivalent to 100^0 Celsius
90^0 Fahrenheit is equivalent to 32.2^0 Celsius
32^0 Fahrenheit is equivalent to 0^0 Celsius
$9/5\,C^0 + 32 = F^0$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

CM.
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INCHES
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